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ABSTRACT

This communication systems guide provides teachers with learning activities for secondary students. Introductory materials include an instructional planning outline and worksheet, an outline of essential elements, a list of objectives, a course description, and a content outline. The guide contains 32 modules on the following topics: story development; computer application (story layout); graphics development; merging text with graphics; duplication process (publishing); cover development; screen print cover (children's books); assembly and quality control; printing methods (a comparison); cellular telephones; fiber optics; computer graphics; drafting fundamentals; basic videography; pinhole camera; media of media of communication; development of the photographic report; television news program; three-dimensional photographs; report; television news program; three-dimensional photogaphs; thermal screen printing; hand-colored black-and-white photographs; computer music video; photographic screen printing; desktop publishing; design and drafting; telecommunication; logo design; photography; future space communication; "how well do you communicate?"; and communicating through good planning. Each module includes an instructor's resource sheet and the student laboratory activity. Each instructor's resource sheet may include the following elements: module number; activity topic; estimated time; essential elements; objectives; activity summary; teaching tips; instructional strategy; equipment/supplies; evaluation key; and support materials. Each student activity may include the following elements: module number; activity topic; activity overview; objectives; vocabulary/concepts reinforced; equipment/supplies; introduction; procedure; evaluation; and support materials. (NLA)

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Communication Systems

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Communication Systems

Laboratory Activities

By

Tony Bertucci
John Glock
Ron McQueen
Mark Murray
Theresa Swann
Alan L. Towler

Coordinated by

Alan L. Towler

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Editor / Barbara Sutherland
Cover Art / Ben E. Smith, Jr.
Artist / Denise Sanderson
Publications Assistant / Kathryn N. Roberts
Production Coordinator / Barbara Sutherland
Director, Materials Development / Barbara E. Selke-Kern, Ph.D.

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Organization of the Laboratory Activity Materials

The major portion of the guide is the compilation of laboratory activity modules. The laboratory activity modules were developed, tested, and reviewed by technology teachers, supervisors, and teacher educators.

Each module includes (1) the student laboratory activity and (2) an instructor's resource sheet.

Each student activity includes the following elements where appropriate:

- Student activity module number
- Activity topic
- Activity overview
- Objectives
- Vocabulary/Concepts Reinforced
- Equipment/Supplies
- Introduction (to the activity)
- Procedure (step by step)
- Evaluation
- Support Materials

Each instructor's resource sheet includes the following elements where appropriate:

- Instructor's resource sheet module number
- Activity topic
- Estimated time
- Essential Elements (common and specific)
- TAAS Objectives
- Activity Summary
- Teaching Tips
- Instructional Strategy
- Equipment/Supplies
- Evaluation Key
- Support Materials

Using the Laboratory Activity Materials

Intended Audience: The material in this guide is designed for use by technology teachers and students in grades nine through twelve. Many of the modules, however, would also be appropriate and recommended for use by junior high/middle school technology programs.

Length of Time for the Materials: The topic of study has been developed to provide materials for 18 to 36 weeks of study. Each module includes a suggested time frame for completion of the activity/module.

Benefits for Teachers and Students: The materials included in this guide were developed to assist technology teachers in planning, organizing, teaching, implementing, and evaluating a technology-based instructional program. The broad exposure students will receive by being involved in the laboratory activities in this guide will enhance their total educational program experience including their problem-solving skills, creative thinking skills, and social interaction skills, as well as communication, computation, and technical skills.

Flexibility of the Materials: This guide, like other curriculum materials, does not attempt to encompass all situations. Therefore, teachers should supplement the guide with other appropriate ideas, information, and activities as needed in their particular programs.

A key feature in this guide is flexibility. The material may be used in the context of a large class/group approach, a small group approach, where appropriate, and, in many of the modules, an individualized approach. In some of the modules, a combination of all three approaches might be incorporated.

Modules should be selected by teachers in the order that they choose, and teachers are encouraged to expand or condense the student laboratory activity to meet the needs of addressing essential elements and the time frame designated to cover the topic. Teachers may also need to make substitutions in the use of each modules, depending on the equipment, resources, and/or reference materials available to them.

Essential Elements/TAAS Objectives: Essential elements and TAAS objectives for reading, writing, and mathematics have been identified in each module (where appropriate). As used in this guide, essential element statements represent skills, knowledge, and/or attitudes that imply the ability or intelligence to accomplish an idea, problem, task, job, etc. Essential element statements will assist the teacher in clearly formulating the scope and sequence of the course of study and the purpose and processes for student learning.

Instructional Planning: An instructional planning outline and worksheet are included in the guide for teachers to use in their planning and preparation. The outline and worksheet should prove beneficial to teachers in enhancing their use of various instructional practices, in identifying appropriate teaching behaviors and process decisions, and in documenting teaching techniques selected.

An Instructional Strategy Approach

Setting the Stage

Instructors involved in the new program of industrial technology education must realize the potential of Communication Systems as they view current and emerging technologies in the area of communication. This course is intended to provide students with a broad base of experiences in several areas of communication technology. Although Communication Systems is not intended to be a prerequisite for entry into other courses such as Communication Graphics, Manufacturing Graphics, or Construction Graphics, it will provide an instructional basis from which to expand if a student shows interest in any particular area. Communication Systems will provide this survey-type course which is badly needed.

Communication Systems has the potential of becoming a very strong industrial technology course. It should attract students who have typically not become involved in our classes for one reason or another. If we consider the importance that is placed on communication as a rapidly growing technology, we should be able to generate a great deal of interest in this new course.

Instructional Strategies

In preparing the preliminary material for this laboratory activity guide, several approaches were considered. The primary concept that we felt should carry through much of the guide is that of *problem solving*. Problem solving brings the element of critical thinking into our instructional program and challenges students at all levels to develop skills that will last a lifetime no matter how rapidly technology changes. Problem solving through critical thinking may very well be the most important element that we can teach to our students in the next decade.

Another instructional strategy that will be important for industrial technology education teachers to use in the coming years is that of *teamwork*. Teamwork is a central element in all areas of communication technology and will prove to be an important component of the Communication Systems course. Several of the activities within this guide use this teamwork approach.

As you read through the laboratory activity guide, you will see other useful instructional methods. Instructor demonstrations will continue to be one of the most important strategies used. The lecture method will also continue to be a necessary component of your instruction.

Strategies for Special Needs Students

Traditionally, industrial technology education instructors have been receptive to including special needs students in their programs. Students with hearing, visual, and other physical handicaps; learning and behavioral disorders; gifted and talented; and those with slow and retarded learning disabilities have all benefited from the attention given them by interested industrial technology education instructors. This attitude should continue to be a part of our program.

Now that we are entering a new era in which our instructional base is becoming more theoretical and more technological, the special needs students must not be left behind. Our transition into the new curriculum areas is happening at a time when mainstreaming of special needs students is on the increase. As you prepare lessons for the Communication Systems course, remember that your program continues to provide individual learning activities that—

1. use concrete learning versus abstract learning;
2. provide visual instruction;

3. continue to provide much needed hands-on experiences; and
4. provide time for individual instruction.

Take advantage of the resources available on your local campus, as well as those within the school district or community. One of the most effective resources available to teachers is the use of peer tutoring in the classroom. Also, seek the help of resource teachers to help plan or modify existing learning activities. Contact community agencies to find adult aides who might be available to help students on a one-to-one basis.

In using this laboratory activity guide for instructional planning, consider each activity as a beginning point from which to expand. All of the activities can be modified to meet the needs of most special needs students. Consider the following list of modifications as you look for various activities for use with students.

1. Use both visual and verbal instruction.
2. Make use of modeling or simulation.
3. Include thorough demonstration processes.
4. Provide immediate feedback and positive reinforcement.
5. Organize instruction to guarantee success for special needs students.
6. Use sequential steps in processes that are not overly complex, and provide for repetition as needed.
7. Use real-life examples in instruction to help reinforce the importance of the learning activity.

Instructional Planning Outline

Domain I. Instructional Strategies

Criterion 1. Provides opportunities for students to participate actively and successfully

Indicator:
a. appropriately varies activities
b. interacts with students in group formats as appropriate
c. solicits student participation
d. extends students' responses/contributions
e. provides ample time for students to respond to teacher questions/solicitations and to consider content as it is presented
f. implements instruction an appropriate level of difficulty

Criterion 2. Evaluates and provides feedback on student progress during instruction

Indicator:
a. communicates learning expectations
b. monitors students' performances as they engage in learning activities
c. solicits responses or demonstrations from specific students for assessment purposes
d. reinforces correct responses
e. provides corrective feedback, or none needed
f. reteaches, or none needed

Domain II. Classroom Management and Organization

Criterion 3. Organizes materials and students

Indicator:
a. secures student attention, or students are attending
b. uses administrative procedures and routines which facilitate instruction
c. gives clear administrative directions for classroom procedures or routines, or none needed
d. maintains seating arrangements/grouping appropriate for the activity and the environment
e. has materials, aids, and facilities ready for use

Criterion 4. Maximizes amount of time available for instruction

Indicator:
a. begins promptly/avoids wasting time at the end of the instructional period
b. implements appropriate sequence of activities
c. maintains appropriate pace
d. maintains focus
e. keeps students engaged

Criterion 5. Manages student behavior

Indicator:
a. specifies expectations for class behavior, or none needed
b. uses techniques to prevent off-task behavior, or none needed
c. uses techniques to redirect off-task behavior, or none needed
d. uses techniques to stop inappropriate behavior, or none needed
e. uses techniques to stop disruptive behavior, or none needed
f. applies rules consistently and fairly
g. reinforces appropriate behavior when appropriate

Domain III. Presentation of Subject Matter

Criterion 6. Teaches for cognitive, affective, and/or psychomotor learning and transfer

Indicator:
a. begins instruction/activity with an appropriate introduction
b. presents information in an appropriate sequence
c. relates lesson content to prior or future learning
d. provides for definition of concepts and description of skills and/or attitudes and interests
e. provides for elaboration of critical attributes of concepts, psychomotor skills, and/or attitudes and interests
f. stresses generalization, principle, or rule as a relationship between or among concepts, skills, and/or attitudes/interests
g. provides opportunities for transfer
h. closes instruction appropriately

Criterion 7. Presents information accurately and clearly

Indicator:
a. makes no significant errors
b. uses vocabulary appropriate to students
c. explains content and/or learning tasks clearly
d. stresses important points and dimensions of content
e. clarifies student misunderstanding, or none needed

Criterion 8. Uses acceptable communication skills

Indicator:
a. uses correct grammar
b. pronounces words correctly and clearly
c. uses accurate language
d. demonstrates skill in written communication

Domain IV. Learning Environment

Criterion 9. Uses strategies to motivate students for learning

Indicator:
a. relates content to student interests/experiences
b. emphasizes the value/importance of the activity or content
c. reinforces learning efforts of students
d. challenges students

Criterion 10. Maintains supportive environment

Indicator:
a. avoids sarcasm and negative criticism
b. establishes climate of courtesy and respect
c. encourages slow and reluctant students
d. provides praise for specific performance
e. establishes and maintains positive rapport with students

Domain V. Growth and Responsibilities

Criterion 11. Plans for and engages in professional development

Indicator:
a. shows progress in completing professional growth requirements as agreed upon with appraiser(s), or none needed
b. stays current in content taught
c. stays current in instructional methodology

Criterion 12. Interacts and communicates effectively with parents

Indicator:
a. initiates communications with parents about student performance and/or behavior when appropriate
b. conducts parent-teacher conferences in accordance with local district policy
c. reports student progress to parents in accordance with local district policy
d. maintains confidentiality unless disclosure is required by law

Criterion 13. Complies with policies, operating procedures, and requirements

Indicator:
a. follows statutory and Texas Education Agency regulations
b. follows district and campus policies and procedures
c. performs assigned professional duties
d. follows district promotion/retention policy and procedures

Criterion 14. Promotes and evaluates student growth

Indicator:
a. participates in campus goal-setting for student progress
b. plans instruction in accordance with district requirements
c. documents students progress
d. maintains accurate records
e. reports student progress at appropriate intervals

Instructional Planning Worksheet

Essential Element(s): _____

TAAS Objective(s): _____

Curriculum Guide Page: _____

Objective: At the conclusion of the lesson, the learner will be able to:

_____

_____

_____

_____

Focus Activity: _____

_____

_____

a. Task for lesson _____

_____

b. Value of lesson to learner is _____

_____

Explanation / Check Understanding:

a. ☐ Lecture ☐ Overhead ☐ Demonstration ☐ _____

b. ☐ Curriculum Guide page ____ ☐ Text page ____ ☐ _____

c. Modeling (teaching will) _____

_____

_____

d. Key questions to check understanding:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Guided Practice Exercise:

☐ Exercise copied from overhead ☐ Handout worksheet No._____

☐ Copy from board ☐ Read sample problems ☐ _____

_____

_____

Checking Mastery (Learning Progress)

☐ View each student's work ☐ Students check and signal correct

☐ _____

☐ _____

Independent Practice: (Reteach those needing help while others work)

☐ Worksheet No._____ ☐ Copy from overhead ☐ Copy from board

☐ Copy as dictated ☐ Reteach worksheet/outline number _____

☐ _____

☐ _____

Extension: (Enrichment/Application)

☐ Worksheet No._____ ☐ _____

Describe how this activity makes relevant application of the lesson: _____

_____

_____

_____

Closure: Restate the learning: _____

_____

Method to involve the learner in the summary: _____

_____

Sponge Activities: Sponge Focus Activity No. _____

Other Sponge Activity No._____

Essential Elements
Common to All Industrial Technology Programs

75.85 The elements in this subsection are common to all industrial technology education courses unless otherwise indicated and shall be included in each course at the appropriate level. They are described here to preclude repetition in each course. Every school offering industrial technology education shall provide courses which include the following essential elements.

1. Leadership concepts and skills. The student shall be provided opportunities to:

   A. demonstrate skills, characteristics, and responsibilities of leaders and effective group members;
   B. demonstrate a knowledge of parliamentary procedure principles;
   C. plan and conduct leadership activities; and
   D. prepare for effective citizenship and for participation in our democratic society.

2. Concepts and skills related to successful employment and/or postsecondary training. The student shall be provided opportunities to:

   A. identify employment opportunities and preparation requirements in chosen fields;
   B. identify effective methods to secure and terminate employment;
   C. demonstrate effective communication skills both oral and written and follow through on assigned tasks;
   D. demonstrate dependability and punctuality;
   E. demonstrate productive work habits and attitudes;
   F. understand the importance of taking pride in the quality of work performed;
   G. recognize the dignity in work;
   H. develop skills in planning and organizing work;
   I. apply required methods and sequences when performing tasks;
   J. apply principles of time management and work simplification when performing assigned tasks;
   K. identify ethical practices and responsibilities; and
   L. understand the importance of the application of organizational policies and procedures.

3. Concepts and skills associated with entrepreneurship. The student shall be provided opportunities to:

   A. identify opportunities for business ownership;
   B. understand the risk and profit motive factor;
   C. understand the elements and advantages of the free enterprise system; and
   D. explain the role of small business in the free enterprise system.

4. Concepts and skills associated with human relations and personality development. The student shall be provided opportunities to:

A. understand the importance of maintaining good health and proper appearance for effective job performance;
B. understand oneself and others;
C. exercise self-control;
D. accept and use criticism;
E. recognize basic human relationship as they relate to business success; and
F. demonstrate characteristics for successful working relationships.

5. Concepts and skills related to personal and business management. The student shall be provided opportunities to:

A. explain how management assists in reaching personal and family goals;
B. explain the management process;
C. describe the role of management in controlling stress;
D. identify and understand personal checking accounts;
E. identify and understand personal loan application processes;
F. identify and understand different financial institutions;
G. identify the role and functions of business management;
H. understand the lines of authority; and
I. identify effective supervisory techniques.

6. Concepts and skills related to the application of safety practices. The student shall be provided opportunities to:

A. demonstrate safe operation of appropriate tools, machines, and equipment;
B. maintain a safe and clean laboratory environment; and
C. investigate appropriate state and federal safety laws.

7. Concepts and skills related to social/cultural impacts of technology. The student shall be provided opportunities to:

A. investigate ideas and technological developments of the past and present;
B. assess the characteristics of technological change on society and culture;
C. predict how selected technological developments will impact future cultures and societies; and
D. explore the impact technology has on the environment.

8. Concepts and skills related to the application of technology to daily life. The student shall be provided opportunities to:

A. evaluate selected products based on given standards or applications;
B. develop criteria for selecting, purchasing, and contracting services;
C. practice the servicing of selected products and equipment of technology;
D. investigate the interrelationship of all technology areas;
E. use computer-controlled systems and/or devices related to each course; and
F. apply the design process to product development.

9. Concepts and skills related to the tools, materials, and processes of technology. The student shall be provided opportunities:

   A. become proficient in the use of appropriate tools, machines, and equipment;
   B. analyze the properties of a wide range of materials of technology through testing;
   C. explore the processes of various technologies; and
   D. investigate and practice conservation and recycling of products and materials of technology.

10. Concepts and skills related to the application of problem-solving techniques. The student shall be provided opportunities to:

   A. identify and creatively solve technological problems using the scientific method;
   B. explore standards of measurement used in technology and apply measurement in the solution of problems; and
   C. communicate oral, written, and computational technical information.

Communication Systems Essential Elements

Communication systems, 11601200, CS (1/2-1 unit). Communication systems is a laboratory-oriented course that includes the common essential elements for industrial technology education, plus concepts and skills related to communication systems. The student shall be provided opportunities to:

1. use accepted standards, symbols, and conventions;
2. use design principles of style, energy efficiency, safety, security, and human engineering;
3. use appropriate drafting conventions to describe the shape and size of products and objects;
4. utilize appropriate photographic, graphic, electronic, and telecommunication equipment to produce communication products;
5. apply drafting conventions to produce drawings in the fields of manufacturing and construction graphics;
6. produce products using photographic materials and equipment.
7. design and produce graphic arts materials;
8. produce products using electronic communication technology;
9. apply the principles of telecommunication; and
10. investigate space-based information services through satellite systems.

TAAS Objectives

ENGLISH LANGUAGE ARTS

Reading Comprehension (RC)

Objective:
1: determine the meaning of words
2: identify supporting ideas
3: summarize written texts
4: perceive relationships and recognize outcomes
5: analyze information to make inferences/generalizations
6: recognize points of view, propaganda, and/or fact and nonfact

Written Communication (WC)

Objective:
1: respond appropriately to the purpose/audience in a written composition
2: organize ideas in a written composition
3: demonstrate control of the English language in a written composition
4: generate a written composition which develops and supports a central idea
5: recognize appropriate sentence construction
6: recognize appropriate word usage
7: recognize within the context of a written passage:
   (a) the correct spelling of words
   (b) correct capitalization
   (c) appropriate punctuation

MATHEMATICS

Concepts (C)

Objective:
1: demonstrate an understanding of the concepts of numbers
2: demonstrate an understanding of mathematical relations, functions, and other algebraic concepts
3: demonstrate an understanding of geometric properties and relationships
4: demonstrate an understanding of measurement concepts using metric and customary units
5: demonstrate concepts related to an understanding of probability and statistics

Operations (O)

Objective:
1: demonstrate skills, concepts, and applications related to addition
2: demonstrate skills, concepts, and applications related to subtraction
3: demonstrate skills, concepts, and applications related to multiplication
4: demonstrate skills, concepts, and applications related to division

Problem Solving (PS)

Objective:
1: estimate solutions
2: analyze problems and identify solution strategies
3: express problems using mathematical representations
4: evaluate the reasonableness of problem solutions

Communication Systems
Course Description and Content Outline

Communication Systems is a course introducing students to the concepts of technical communication. In this activity-based course, students explore the resources, processes, management, and products in the technical areas of drafting, photography, graphic arts, electronic communication, and telecommunication. The course emphasizes problem solving, design principles, technical standards, and use of related equipment. Examples of student learning activities are: design the advertising for a product, design and produce a multimedia presentation, develop a model communications network, and control product quality with computers. Examples of equipment used are: cameras, computers, recorders, copiers, printers, drafting tools, transmitters, and receivers. *9-12 Grades, 1/2-1*

Essential Elements	Suggested Content Outline	Suggested Learning Activities
	I. Introduction	
	A. Overview	
	1. Types of communication systems	Collect examples of technical drawings, photographs, printed media, and electronic communication methods.
	a. Drafting	
	(1) Presentation drawings	
	(2) Technical drafting	
	b. Photography	
	(1) Still pictures	
	(2) Motion pictures	
	c. Graphic arts	
	(1) Printing	
	(2) Copying	
	d. Telecommunication	
	(1) Fiber optics	
	(2) Microwave	
	e. Electronic communication	
	(1) Satellite	
	(2) Networking	
	2. Functions of communication systems	Identify types of technical communication.
	a. Design	
	(1) Innovations	
	(2) Presentation methods	
	b. Production	Identify types of communication equipment.
	(1) Equipment	
	(2) Processes	
	(3) Scheduling	
	c. Distribution	Describe methods used to transfer information.
	(1) Personal communication	
	(2) Mass communication	

3. Careers in communication systems
   a. Professionals — Identify careers in the area of communication systems.
      (1) Photographers
      (2) Graphic artist
      (3) Engineers
      (4) Designers
   b. Technicians — List classification of jobs related to the communication field.
      (1) Laboratory technicians
      (2) Paraprofessionals

B. Impacts of communication systems
   1. Past — Review history of technical communication systems.
      a. History of communication systems
      b. Evolution of technical communication
   2. Present — Identify examples of technical communication and show relationship to transfer of information.
      a. Importance of communication systems
      b. Economic value of technical communication
      c. Environmental impacts
   3. Future — Brainstorm ideas about future types of communication.
      a. New communication methods
      b. Effects of space technologies
      c. Integrating communication systems with other technology systems — Illustrate types of communication that will be used in space.

C. Interrelationship of communication systems with other technologies
   1. Communication technology — Make a list of communication activities and show how they are used in the other technologies.
   2. Energy technology
   3. Production technology

D. Interrelationship of communication systems with other disciplines
   1. Basic academic skills — Identify other disciplines needed to complete communication activities and show how communication systems are used to facilitate communication in the other disciplines.
   2. Sciences
   3. Humanities

II. Elements of Communication Systems
   A. Types of communication — Make simple communication models, such as:
      1. Human — Pinhole camera
      2. Machine — Rubber stamp
      3. Crossover — Computer interface control
   B. Methods of technical communication — Intercom telephone to
      1. Sound and speech — TV recording
      2. Symbols and codes — Poster
      3. Printed media — Map of school grounds

4. Drawing practices	Simulate satellite receiver.
5. Photographic processes	Print a bumper sticker.
6. Electronic methods	Set up a radio network.
C. Processes	Set up a computer network.
1. Systems model	
a. Input	
(1) People	
(2) Materials	
(3) Information	
(4) Capital	
(5) Energy	
b. Process	
(1) Encoding	
(2) Transmitting	
(3) Receiving	
(4) Storing	
(5) Retrieving	
(6) Decoding	
c. Output	
(1) Relocated ideas	
(2) Information	
d. Feedback	
(1) Positive	
(2) Neutral	
(3) Negative	
2. Communication model	Design communication products and identify how they fit the model.
a. Transmitter	
b. Channel	
c. Interference	
d. Receiver	
e. Feedback	
3. Design and problem solving	Practice problem-solving methods for the production of communication activities.
a. Identify the task	
b. Preliminary ideas	
c. Refinement of ideas	
d. Analysis of solutions	
e. Determine best solution	
f. Implement solution	
4. Research and development	Identify methods and materials used to transmit information.
a. Planning principles	
b. Basic communication processes	
(1) Information handling	
(2) Materials processing	
(3) Presentation methods	
5. Quality assurance	Make list of characteristics to be used to check the quality of communication products.
a. Sampling technique	
b. Classification of defects	
c. Acceptance or rejection	

D. Measurement systems
   1. American Standard—(ANSI) inch — Practice using measurement systems and tools.
   2. SI—metric
   3. ASA/ISO
   4. American point system
E. People
   1. Leadership — Form a classroom management organization and simulate a communication firm.
   2. Management
   3. Entrepreneurship
   4. Employment
F. Information
   1. Sending and receiving — Develop an office record-keeping system.
   2. Categorizing
   3. Handling
      a. Encoding and decoding
      b. Measurement of efficiency
G. Safety — Complete safety test.
   1. Laboratory practices
   2. Personal practices
   3. Safety laws
H. Service
   1. Maintenance of equipment — Practice maintenance of basic communication equipment.
   2. Repair of equipment
   3. Contracted services — Identify types of contracted services.

III. Applications of Communication Systems
   A. Similarities between communication types
      1. Processes
      2. Resources
   B. Forms of communication with technical systems
      1. Sound and speech systems
         a. Telephone
         b. Sound recording
         c. Radio
      2. Symbols and codes systems
         a. Alphabet and numbers
         b. Morse
         c. ASCII
         d. Universal Product Code
         e. Digital and analog
      3. Printed media — Identify other disciplines needed to complete communication graphics activities, and show how communication graphics are used to facilitate communication in the other disciplines.
         a. Newspapers
         b. Typewriters
         c. Copying machines
         d. Desktop publishing
         e. Phototypesetting

f. Electronic printing
4. Technical drawings
a. Manufacturing plans
b. Building plans
c. Maps
d. Charts and graphs
e. Civil construction plans
f. CAD applications
5. Photographic media
a. Fine arts
b. Technical
c. Photojournalism
d. Scientific
e. Medical
f. Television
g. Radiographs
6. Electronic communication
a. Electronic mail
b. Voice mail
c. Networking
d. Office automation
e. Storage and retrieval
7. Telecommunication
a. Satellite
b. Fiber optic
c. Teleconferencing

C. Communication and perception
1. Sensory system
a. Sight
b. Sound
c. Smell
d. Taste
e. Touch
f. Mixing of senses
2. Verbal communication
3. Nonverbal communication
4. Perception

D. Visual organization
1. Design elements
a. Dot
b. Line
c. Shape
d. Value or tone
e. Texture
f. Color
g. Space
2. Design principles
a. Balance

Make simple communication models.
Pinhole camera
Rubber stamp
Wireless microphone

Make contact prints.
Make multiple copies.

Practice communication processes by solving one or more of the following tasks:
Photograph of people
Print a poster
Assemble a telephone network
Make a satellite receiver
Electronic photograph
Produce a TV commercial
Produce a slide show
Publish a small book
Use a computer for desktop publishing
Make training aids
Simulate an electronic billboard
News photographs
Action photographs
Laser photographs
Holograph photographs
Computer-aided photographs

Design communication products and identify how they fit the model.

Practice problem-solving methods for the production of communication activities.

Identify methods and materials used to transmit information.

Experiment with alternate methods to transmit information.

b. Proportion
c. Rhythm
d. Harmony
e. Dominance
f. Movement
g. Unity

3. Physical principles
   a. Time
   b. Movement
   c. Form
   d. Light and shadow
   e. Matter and energy

Have students use layout equipment and tools.
Develop a poster or flyer of a current school or community activity.

E. Visual systems
   1. Visual language
      a. Symbols
      b. Messages
   2. Technical drawing
      a. Hand lettering types
      b. Shape geometry
      c. Multiview drawing
      d. Pictorial views
   3. Photographic systems
      a. Black-and-white photography
      b. Color photography
      c. Cinematography
      d. Television
      e. Microfilm
      f. Holography
      g. Laserphoto
      h. Radiography
   4. Printing
      a. Typography—hot/cold type
      b. Raised surface printing—relief
      c. Plane surface printing—lithography
      d. Sunken surface printing—gravure
      e. Through-the-surface printing—screen
      f. Spray on surface printing—ink jet
      g. Electrostatic printing—laser
   5. Copying
      a. Diazo process
      b. Thermal process
      c. Spirit duplication
      d. Mimeograph duplication
      e. Electrostatic copying

Discuss and analyze advertising and packaging design.
Prepare a one-page layout.

Practice visual design principles.

Compose photographs.
Experiment with light.

Experiment with optics.

Use one or more of the photographic methods to produce graphic images.

F. Audio systems
   1. Nature of sound
   2. Acoustical energy
   3. Radio
   4. Sound recording

5. Telephone

G. Electronic systems

1. Electron theory
2. Electrical components
3. Electrical circuits
4. Television
5. Satellites
6. Networking
7. Computers

Solve various communication problems.

IV. Impacts of Technology

A. Consumer
B. Environment
C. Social/Cultural
D. Economic

Identify environmental problems associated with communication methods.

Identify the economic value of communication systems.

V. Technology Enterprise

A. Organization

B. Management
C. Entrepreneurship
D. Labor relations
E. Product
1. Design
2. Development
3. Production
4. Distribution
5. Service

Simulate a communication company and practice business activities.

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STORY DEVELOPMENT

Essential Elements: Common: 2C, D, E, H, I, K; 4B, C, F; 8F
Specific: 14, 17
TAAS Objectives: Language Arts: RC 1-6, WC 1-7

Activity Summary
In this portion of the children's book project, the students will examine children's books, develop a theme, develop a storyline, and understand basic concepts that deal with children learning to read. As future parents, students can benefit from ideas about teaching their children to read and the importance of reading to children. It validates the project they are beginning and, hopefully, teaches them to read to their own children. It is important that all students contribute and feel successful.

Teaching Tips
1. Have students gather closely together to develop a sense of intimacy, and read a selection of children's books to them. Include Dr. Seuss to illustrate how made-up words can tell a story and illustrate the development of language.
2. Brainstorm ideas for stories, either in small groups or as a class. Be sure that the students understand the concept of brainstorming and are not critical of each other's ideas. Some of the best stories start from some unbelievably silly concepts.
3. Use large sheets of paper and colored markers, pencils, or crayons to write ideas that develop from the brainstorming.

Instructional Strategy
- Discuss the importance of reading as a basic skill, allowing the students to come up with their own reasons. In addition, you should discuss the importance of oral language as a skill necessary to learning to read.
- Discuss the children's books you read to them, deciding which is a "good" book. Come up with a list of reasons it was a good book.
- List the key items that all of the books had in common that made them good books, such as rhythm, repetition, rhyme, or early reading concepts such as teaching the alphabet, numbers, or shapes and colors.
- Look at the use of "life lessons" as a concept, such as Berenstains' Bears series that deal with early childhood concepts such as baby-sitters, healthy diet, etc. List some "life lessons" that the students think are important.
- Have each group decide on three to five story ideas, and develop an outline, as a group, for each idea.
- Write a query letter to the book editor at a publishing company. The class and teacher act as final selection committee and publishing representative. This simulates what would be done if they wanted to publish a book.

Equipment/Supplies
1. Paper
2. Pencils, pens, markets, or crayons
3. Selection of children's books
4. Computer (optional, but helpful)

Evaluation Key

1. Participation in the group
2. Query letter written in standard business format and standard American English
3. Story idea decided upon
4. Outline written

STORY DEVELOPMENT

Develop a story line, and understand basic concepts of story development.

Objectives

- To identify and discuss ways children learn to read and the importance of being read to as small children
- To identify and discuss characteristics of a good children's book
- To practice brainstorming techniques to identify themes for your children's book
- To write an outline and include it in a letter to a publisher
- To participate successfully in a group, ensuring that all members are contributing and feel successful

Vocabulary/Concepts Reinforced

- Repetition
- Rhyme
- Rhythm
- Life skills
- Oral language
- Written language
- Symbols
- Query
- Letter
- Outline
- Participation
- Successful
- Alphabet
- Numbers
- Brainstorm
- Critical
- Noncritical

Equipment/Supplies

- Paper
- Pencils, pens, markers, or crayons
- Selection of children's books
- Computer (not necessary, but helpful in the writing part of the activity)

Introduction

In this activity, you will begin to understand the importance of reading to small children to help them learn oral language and teach them about colors, shapes, the alphabet, numbers, and "life lessons." It has been shown that children who are read to as small children have a better reading ability later in school. There are many children's books on the market today, and the industry is expecting sharp rises in numbers in the next few years as the importance of reading to children becomes more understood. In this and later activities, you will simulate part of that industry as you write, illustrate, and publish a children's book.

A children's book begins with ideas that a person or a group develops. Groups can develop ideas with a method called brainstorming. *Brainstorming* is a process where all members of the group contribute ideas as quickly as they come to mind, each idea building on the one before it. It is very important that all ideas be written down and that no comments about their "goodness" or "badness" be made. Ideas should flow, and for that to happen, people must feel that they will not be criticized by the group. As soon as someone makes a negative remark about an idea, new ideas will stop flowing. Part of your job as a group member is to participate with and support the other group members.

Once an idea is decided upon, the next step is to write a story line—in outline form. Brainstorming can again be used to get ideas about what will happen in your story. Do several of your story ideas this way. This will allow the best ideas to come forth and grow. Once your group has decided on the best story or stories, write a letter to your publisher.

In the letter to the publisher (query), include your outline, and ask the publisher if he/she would be interested in your story. Check with your teacher on proper letter formats for a business letter and how to indicate enclosures.

Procedure

1. Listen as your teacher reads a selection of children's stories to you.
2. Discuss which stories are the best, what they teach small children, and what all of the books have in common.
3. List the key items that all of the books have in common that make them good books.
4. Decide on three to five story ideas, and develop an outline, as a group, for each idea.
5. Write a query letter to the book editor at a publishing company. The class and teacher act as final selection committee and publishing representative. This simulates what would be done if you wanted to publish a book.

Evaluation

1. Group participation
2. Outline
3. Query letter written in standard business format and standard American English
4. Final story idea decided upon

Support Materials

- Children's books
- Business communication text
- Language arts text

COMPUTER APPLICATION—STORY LAYOUT

Essential Elements: Common: 2C, 2H, 2I, 4D, 5H, 8E, 8F, 9A
Specific: 4, 7, 8
TAAS Objectives: Language Arts: WC 2-6

Activity Summary

In this unit students will learn to use the word processor program on the IBM and/or Apple computer and to edit story text and lay out the pages of their book.

Teaching Tips

1. Before actually doing data entry or word processing, have the students write a rough draft of the children's story on the story worksheet handout.
2. After completing the rough draft, the students are ready to move to the computer. They should be introduced to basic computer terms and to menu commands.
3. If you are using IBM with a print screen command, it is handy to print out the menu commands so that students have a hard copy to which they can refer. This saves time answering questions about where particular commands are located. Be sure you tell the students where any "help" or "tutorial" menus are located at the onset of computer time.
4. Some groups will write faster than others, which will allow you to rotate students on the computers.
5. Have groups edit each other's rough drafts and the text developed on the computer.

Instructional Strategy

- List computer terms and discuss the meaning of each.
- Identify menu commands for your particular word processing program.
- Have each group write a rough draft of its story on the story worksheet handout. Be sure that the amount of text developed is not limited too much at this time; it will be shortened and edited when the text is edited and the graphics are merged. It is better to have too much text at this point than too little.
- Have the students draw their main character, because having an idea of what the character looks like helps the story to flow better.
- Use the page layout worksheet to develop the storyboard.

Equipment/Supplies

1. Pencil, pen, paper
2. Computer
3. Printer

Evaluation Key

1. Group participation
2. Key for computer test:

1. B	2. C	3. C	4. B	5. B
6. D	7. A	8. B	9. B	10. A
11. C	12. B	13. C	14. C	15. E

COMPUTER APPLICATION—STORY LAYOUT

Use the computer to edit and make a page layout of your story.

Objectives

- To learn to compose, edit, format, and print a short children's story
- To be able to understand, identify, and apply computer terminology
- To be able to work in a group

Vocabulary/Concepts Reinforced

- Disk drive (A, B, C)
- Output device
- Root directory
- Keyboard
- Monitor
- DOS
- Change directory (CD\)
- Menu commands
- Input device
- Directory
- Boot
- Mouse
- Printer
- Software
- Parkhead

Equipment/Supplies

- Pencil, pen, paper
- Computer
- Printer

Introduction

Most industries use word processing as a means of communicating ideas and information. Word processing allows the communicator to do more than simply produce a typed copy of whatever bit of information he/she wishes to convey. In some instances, it has made some office jobs obsolete since the person composing has the ability to edit and type the letter, as well as compose it. This can be cost-effective and timesaving because it cuts out the role of the typist. At the same time, the technology allows for other office workers to assume more responsibility as they no longer simply type what the boss dictates, but now compose, type, edit, and print the information. These people must be able to write well and assume responsibility.

Learning to use the word processor program on the IBM and/or Apple computer is simply a matter of having a basic understanding of the hardware, software, and menu commands within the word processing software. As you compose, enter data, edit, and print the children's story, you will develop a basic understanding of how the software works and the advantages it has over pen and pencil writing. You will also learn to lay out the pages of the story and to print text in the appropriate places on the page.

Procedure

1. Write a rough draft of your story from the outline developed in Activity 1.
2. Enter the story on the computer.
3. Run the spell check program (if available).
4. Edit the copy, and submit hard copy to the editor (teacher or another group).

5. Make revisions.
6. Using the page layout worksheet, determine which text would fit on the page.
7. Format your page (on the computer) to accept that amount of text, in the largest font your program allows.
8. Paginate and edit for layout, font, and data entry errors.
9. Submit to editor.
10. Make final revisions.
11. Print.
12. After graphics are developed and completed, text editing may be needed again.

Evaluation

1. Test on computer terms
2. Each editorial submission will be an evaluation of the work in progress.
3. Group participation

Story Worksheet

1. Draw your main character in the block above.
2. Write your story below. Continue on the back of this sheet if additional space is needed.

Page Layout Worksheet

1. Sketch one supporting graphic above.
2. Write one page of text here.

NAME: _____ PERIOD: _____ DATE: _____

Computer Test

1. 3 1/2" Drive on IBM Ps2
   A. A Drive B. B Drive C. C Drive

2. Hard disk drive
   A. A Drive B. B Drive C. C Drive

3. To start the computer
   A. Root directory B. Mouse C. Boot

4. DOS command for change directory
   A. Root directory B. CD\ C. Boot

5. An input device
   A. Monitor B. Mouse C. Boot

6. When unsure of what to do next, you should—
   A. Use the tutorial B. Use the "help"
   C. Ask teacher D. A, B, C

7. Main directory on IBM Ps2
   A. Root directory B. Mouse C. Subdirectory

8. Disk operating system
   A. Directory B. DOS C. Menu

9. Command that pulls the read head of the hard disk
   A. Root directory B. Parkhead C. Boot

10. Menu where "save" and "save as" commands are located on the Microsoft Word program
    A. File B. Edit C. Print D. Select E. Options

11. Menu where "Print" and "Layout" commands are located on the Microsoft Word program
    A. File B. Edit C. Print D. Select E. Options

12. Menu where "Copy" and "Move" commands are located on the Microsoft Word program
    A. File B. Edit C. Print D. Select E. Options

13. Menu where "Character" and "Bold" commands are located on the Microsoft Word program
    A. File B. Edit C. Print D. Format E. Options

14. Menu where "Paragraph" and "Tabs" commands are located on the Microsoft Word program
    A. File B. Edit C. Format D. Select E. Options

15. Menu where "Check spelling" command is located on the Microsoft Word program

A. Format B. Edit C. Print D. Select E. Options

GRAPHICS DEVELOPMENT

Essential Elements: Common: 1A, 2C-F, H-J; 4C, D; 6; 8; 9A
Specific: 11, 12, 14, 17
TAAS Objectives: Language Arts: WC 4
Mathematics: PS 2, 4

Activity Summary
In this activity, students apply the story line and learn to develop appropriate graphics to support the short story they wrote.

Teaching Tips
1. Use the story pages developed in Activity 2 as a storyboard. Hang the story in sequence on the board or wall.
2. Use small groups to begin to develop graphics to support the story.
3. If you have a copier that reduces, it is nice to draw the graphics large and reduce for final copy. This eliminates some of the drawing errors and sharpens the images.

Instructional Strategy
- Discuss the storyboard as a method of tracking the growth of the book and sequencing the work at hand.
- Again, bring examples of children's books and coloring books.
- If your students are not naturally artistic, have them trace graphics that are similar to what they want until they feel comfortable developing their own.
- Discuss design and composition concepts.
- Practice exercises to develop design and composition techniques.
- Develop thumbnail sketches of proposed graphics.
- Develop a rough layout of the graphics and text.
- Develop a comprehensive layout of the final book.
- Proofread the final copy.
- Revise as needed.
- Print by methods available at your school, such as spirit masters, photocopiers, or more sophisticated methods.

Evaluation Key
1. Test students on vocabulary words.
2. Evaluate the thumbnail sketches, rough layout, and comprehensive layout for design, composition, and quality of work.

GRAPHICS DEVELOPMENT

Develop appropriate graphics for your story.

Objectives

- To learn to compose, edit, format, and print a short children's story
- To be able to develop a thumbnail sketch, rough layout, and comprehensive layout
- To be able to work in a group
- To be able to apply basic design concepts
- To be able to develop graphic support for story text

Vocabulary/Concepts Reinforced

- Storyboard
- Thumbnail sketch
- Design
- Composition
- Rough layout
- Comprehensive layout
- Dot
- Line
- Texture
- Color
- Shape

Equipment/Supplies

- Paper
- Copies of page layout worksheet developed in Activity 2
- Pencils and erasers

Introduction

In this activity, you will learn how to develop graphic support for text developed in the last activity. A storyboard will be used as a method to track the growth of the book and sequence the work at hand. Again, using examples of children's books and coloring books, try to see how the story text and graphics flow as a unit. They probably were not developed as a unit, but rather by separate people in separate locations. Your goal is to get the text and graphics to function together to tell a story. As you work on the graphics, you will be practicing design and composition concepts used in the publishing industry.

The steps usually followed include developing thumbnail sketches of proposed graphics, developing a rough layout of the graphics and text, developing a comprehensive layout of the final book, proofreading the final copy, making revisions as needed, and printing your book by whatever methods are available at your school (spirit masters, photocopiers, or more sophisticated methods.

Procedure

1. Develop the storyboard to track the growth of the book.
2. Develop thumbnail sketches of proposed graphics.
3. Develop a rough layout of the graphics and text.
4. Develop a comprehensive layout of the final book.

5. Proofread the final copy.
6. Revise as needed.
7. Print by methods available at your school.

Evaluation

1. Ask your instructor for the teacher-developed test.
2. Each editorial submission will be an evaluation of the work in progress.
3. Group participation

MERGING TEXT WITH GRAPHICS

Essential Elements: Common: 2C-F, 2H-J, 8E, 9A, 10C
Specific: 1, 4, 7
TAAS Objectives: Language Arts: WC 5, 6, 7

Activity Summary

This activity merges the computer-generated text with the original graphics developed in previous activities. Depending on the printing method you will use to duplicate the final product (children's book), this module will vary greatly. If spirit master and/or photocopier will be used, then the process of combining the computer-generated text with the original graphics is relatively simple.

Teaching Tips

1. Have the students use drafting equipment and nonreproducing blue pencil to lay out the guidelines for the final page.
2. Have students transfer the graphics to the layout page by tracing or by cutting and pasting with wax or rubber cement. Tracing seems to work best because it does not destroy the original in case an error must be corrected.
3. Print out another copy of the text from the computer, making sure that the ribbon is good so that the printout is very crisp.
4. Have students carefully cut out the blocks of text and paste them on the layout page. If an error is made here, unlike original art, it is a simple matter to print out additional copies of the text if needed.
5. Have students proofread text and art once again, checking for errors.
6. If you have a graphics scanner on your computer, it is a simple process to scan the graphic and merge it with the text, all on the computer. This would probably require output to be on a laser-type printer to get top-quality art as well as text.

Instructional Strategy

- Discuss how mechanicals are developed in the printing/publishing industry.
- Explain the pasteup procedure that the class or group will be using.
- Explain what the proofreaders will be looking for and how errors might be corrected. Get ideas from the class on how they think errors could be corrected.
- Show the systems model and how the activity uses it.
- Demonstrate the use of drafting equipment and how to use it to lay out the page.
- Demonstrate how to tape down an original and trace it.
- Have the students go over the tracing in black ink to develop the final copy.
- Demonstrate how to cut blocks of text and attach them to the layout.

Equipment/Supplies

1. T square
2. Triangles
3. Scale
4. Scissors or X-acto knife and cutting surface
5. Tracing paper
6. Rubber cement or wax
7. India ink and pens

Evaluation Key

1. Layout page developed
2. Graphics traced and inked
3. Text printed out and cut and pasted
4. Final product ready for duplication in crisp black and white

MERGING TEXT WITH GRAPHICS

Merge your story text with appropriate graphics.

Objectives

- To be able to develop page layouts using drafting equipment and nonreproducing blue pencil to lay out the guide lines for the final page
- To be able to transfer the graphics to the layout page by tracing or by cutting and pasting with wax or rubber cement
- To be able to print out another copy of the text from the computer
- To be able to cut out the blocks of text and paste them on the layout page
- To be able to proofread text and art

Vocabulary/Concepts Reinforced

- Pasteup
- Mechanical
- Layout
- Trace

Equipment/Supplies

- T square
- Triangles
- Scale
- Scissors or X-acto knife and cutting surface
- Tracing paper
- Rubber cement or wax
- India ink and pens

Introduction

To be able to make many copies of the children's book that you have written, you must make a master copy of the book. To do this, you must combine the text written in Activity 2 with the pictures you have drawn. In the printing/publishing industry, you would be making a camera-ready mechanical. Most schools do not have the expensive equipment to be able to publish by the same means as in industry, so you will make your pages ready to be published using either a thermal master or photocopier. The process is similar but not identical to the one used in industry. Each page that you will publish must be very carefully assembled and inked in black so that it will copy cleanly. Your final product will only be as good as your pasted-up mechanical.

Procedure

1. Get out the original art you developed in a previous activity.
2. Tape down the original, making sure it is square with the T square.
3. Using tracing paper taped over the original and a blue nonreproducing pencil, trace the art.
4. Have the editor or teacher check the tracing for accuracy.
5. Go over the tracing in black ink to develop the final copy.
6. Cut out the blocks of text printed out from the computer, and attach them to the layout using rubber cement or wax.

7. Have the editor or teacher check the pasteup for accuracy.

Evaluation
- Group participation
- Tracing and inking of artwork
- Pasteup of text with graphics
- Final product

Support Materials
- Graphic communication text
- Communication technology text
- Printing text

DUPLICATION PROCESSES—PUBLISHING

Essential Elements: Common: 2C, E, F, H, I, J; 8E; 9A; 10C
Specific: 1, 4, 7
TAAS Objectives: Mathematics: O 1

Activity Summary

In this activity, the student learns to use available duplication or printing equipment to mass-produce multiple copies of the story/coloring book. It will be assumed the school has a thermal master and a photocopier. This is a good time to discuss methods of printing commonly done in industry, such as lithography, screen, and gravure, as well as the digital presses of the future.

Teaching Tips

1. Be sure that you are familiar with your school's equipment and how to run it.
2. Talk to personnel in charge of the equipment prior to bringing a group of students to use it. Explain what you are doing and request help; this tends to soothe nerves in advance.

Instructional Strategy

- Double-check the mechanicals developed in Activity 4. Thermal masters are expensive, as are photocopier processes.
- Explain to the students that they may be invading the space of office personnel and/or teachers and that to complete this project they must be on their very best behavior while duplicating.
- Explain how electrostatic copies are made, how heat is used to make the thermal master, and how spirit duplication uses solvents to dissolve ink from the master.
- Demonstrate the equipment.
- Print the pages of the book using available equipment.

Equipment/Supplies

1. Photocopier and/or spirit duplicator
2. Paper

Evaluation Key

1. Group participation
2. Quality of copies printed
3. Final product

DUPLICATION PROCESSES—PUBLISHING

Mass-produce your storybooks.

Objectives

- To develop an understanding of printing and duplication processes
- To participate successfully in a group, ensuring that all members are contributing and successful.
- To produce a product in a timely and organized manner
- To complete work using school resources outside the classroom and behave in a "professional" manner.

Vocabulary/Concepts Reinforced

- Electrostatic
- Toner
- Thermal fax
- Spirit duplication
- Stencil
- Carbon-based
- Collate

Equipment/Supplies

- Photocopier and/or spirit duplicator
- Paper

Introduction

Electrostatic printing is a duplication method that uses a drum that has a charge. An ink called toner adheres to the drum wherever there would be an image. Paper receives an opposite charge and attracts the toner to it. Heat is then used to fuse the toner to the paper surface. The photocopier (such as Xerox) is an electrostatic copier. This is said to be a nonimpact printing method. It is used for small numbers of copies because it is expensive and slower than impact printing methods such as lithography, screen, or gravure.

Another image transfer method is the spirit duplication process. You are probably familiar with it. It is the purple inked paper you commonly see in schools. It is very inexpensive to use. It involves a master stencil, a solvent and a machine to run the master on. The master is attached to a drum on the machine. As the drum rotates, it travels through a solvent bath that dissolves a small amount of the ink on the master. Paper travels through the machine and is printed as it comes into contact with the wet ink.

To make a master for the spirit duplication method, you must use one of two methods. The first is to draw, write, or type directly on the stencil. The other involves making a thermal master by using a carbon-based original. You can make a carbon-based original by photocopying any page. The toner is carbon-based. Insert the original face up in the stencil, and run it through the thermal fax machine. Heat causes the stencil to be cut (transfer the ink). Then it is placed on the drum

and copies are made. The disadvantage to this method is that the quality of the final product is not as good as with other methods.

Procedure

1. Check the mechanicals developed in Activity 4.
2. If you are using a photocopier as your duplication method, run one copy of each page before the total run.
3. Check that the contrast is correct and that the images are copying dark and crisp with no extra marks on the page.
4. If you are using spirit duplication with a thermal master, do steps 2 and 3, and then make your master stencil. Make sure it is aligned properly so that you do not get extra marks on the page.
5. Make enough copies of each page to complete the predetermined number of books.
6. Collate the pages so that each book contains the proper number of pages in the correct order.
7. Have the editor or teacher check the work.

Evaluation

1. Group participation
2. Quality of copies printed
3. Final product

Support Materials

- Graphic communication text
- Communication technology text
- Printing text

COVER DEVELOPMENT

Essential Elements: Common: 1A; 2C, D, E, F, H, I, J; 4C, D; 6; 8; 9A
Specific: 11, 12, 14, 17
TAAS Objectives: Language Arts: WC 4
Mathematics: PS 2, 4

Activity Summary
In this activity, students develop the art for the cover and the masters for screening the covers of the children's book.

Teaching Tips
1. Gather a collection of children's books, and examine the covers and title pages.
2. Brainstorm ideas for covers, either in small groups or as a class. Be sure that the students understand the concept of brainstorming and are not critical of each other's ideas.
3. Use large sheets of paper and colored markers, pencils or crayons to write down ideas that develop from the brainstorming.
4. Review the steps for rough layout and final layout from previous activities.

Instructional Strategy
- Discuss the importance of the cover as a marketing method for books.
- Discuss the books' covers as you show them, deciding which is a "good" book cover. Come up with a list of reasons why a cover and title page were good.
- List the key items that all of the covers had in common that made them good book covers, such as color, balance, theme, and title.
- Decide on two or three ideas for each book to develop further.
- Title and sketch each cover and title page.
- Complete the cover title page design.
- Draw the graphics and develop the text either manually or on the computer.
- Cut and paste the final copy, and photocopy it.

Equipment/Supplies
1. Paper
2. Pencils
3. India ink and pen
4. Drafting equipment

Evaluation Key
1. Group participation
2. Design development and layout
3. Accuracy of master

COVER DEVELOPMENT

Develop the art for the cover of your storybook.

Objectives

- To learn to compose, edit, format, and print a cover for children's book
- To be able to develop a thumbnail sketch, rough layout, and comprehensive layout for the cover and title page
- To be able to work in a group
- To be able to apply basic design concepts
- To be able to develop graphic and text support for the book cover and title page

Vocabulary/Concepts Reinforced

- Cover
- Design
- Rough layout
- Dot
- Texture
- Shape
- Marketing
- Thumbnail sketch
- Composition
- Comprehensive layout
- Line
- Color
- Title page

Equipment/Supplies

- Paper
- Pencils
- India ink and pen
- Drafting equipment

Introduction

What sells a book is its cover. When the marketing campaign gets under way, the cover is the key element. Effective cover design can make the difference between profit and loss for many books. Normally the cover design is contracted out by the publishing company or developed in-house. Either way the author has little to say about the cover of the book that he/she wrote. In this activity, you will develop the cover for the book you have written as a class or group. It needs to be attractive and able to "sell" your book. You will use the same process that you used to develop text and graphics for the book itself.

Procedure

1. Develop thumbnail sketches of proposed graphics.
2. Develop a rough layout of the graphics and text.
3. Develop a comprehensive layout of the final cover and title page.
5. Proofread the final copy.
6. Revise as needed.

Evaluation

1. Group participation.
2. Design development and layout
3. Accuracy of master

Support Materials

- Graphic communication text
- Communication technology text
- Printing text

52

SCREEN PRINT COVER—CHILDREN'S BOOK

Essential Elements: Common: 1A; 2C-F, H, I, J; 4C, D; 6; 8; 9A
Specific: 11, 12, 14, 17
TAAS Objectives: Language Arts: WC 4
Mathematics: PS 2, 4

Activity Summary

In this activity, students learn to use screens to mass-produce the children's book cover. These can be hand-cut, photoemulsion screens or thermal screens. For this activity, thermal screens will be used because they are very easy for students to use with a high degree of success. The art and layout for the cover was done in Activity 6.

Teaching Tips

1. Check the art and layout done in Activity 6.
2. Be sure you have a good-quality photocopy of the cover and title page.
3. The title page can be silk-screened on the back of the cover to save card stock or paper, but this is not consistent with industry.

Instructional Strategy

- Introduce screen print methods and materials.
- Explain the uses for screen processes—everything from T-shirts to the sides of trucks can be screened.
- Demonstrate a screen print. Keep an old one on hand just for this purpose—they last for years.
- Demonstrate how to make the thermal screen and mount it on the frame.
- Demonstrate cleanup and care of screens, squeegees, and frames.

Equipment/Supplies

1. Thermal silk screens
2. Squeegees
3. Frames
4. Double-sided tape and masking tape
5. X-acto knife
6. Backing board made of hard board
7. Paper
8. Card stock or tag board cut to size of cover

Evaluation Key

1. Group participation
2. Checking each step
3. Accuracy of screen print

SCREEN PRINT COVER—CHILDREN'S BOOK

Mass-produce the cover of your storybook using the screen printing method.

Objectives

- To develop an understanding of printing and duplication processes
- To participate successfully in a group, ensuring that all members are contributing and successful
- To produce a product in a timely and organized manner

Vocabulary/Concepts Reinforced

- Thermal screen
- Frames
- Hand-cut
- Stencil
- Squeegees
- Card stock
- Photoemulsion
- Silk screen

Equipment/Supplies

- Thermal silk screens
- Squeegees
- Frames
- Double sided tape and masking tape
- X-acto knife
- Backing board made of hard board
- Paper
- Card stock or tag board cut to cover size

Introduction

Screen printing methods are very flexible. Screen printing is a process where a stencil is cut by some means and mounted on a screen made from silk, polyester, or nylon. After the stencil is mounted to the screen and the screen is mounted to a frame to stiffen it, ink is forced through the cuts in the stencil and through the screen using a squeegee. A relatively thick layer of ink is applied to the surface being printed. This method allows printing to be done on a variety of materials and surfaces. Your favorite concert T-shirt may well have been produced using screen printing. The delivery truck with pictures on the side is another application for screen printing. This method allows for many types of ink to be used, such as inks that are able to stand up to the sun and road grime. It allows T-shirts to be printed both before and after the shirt is manufactured. The only disadvantage is that it is a relatively slow method of printing.

In the classroom, however, it is fast enough to mass-produce the cover and title page for your book. To make the covers you will be using a type of screen called thermal screens. The stencil is cut using the heat from the thermal fax machine. This allows for very detailed designs to be printed. You can also use several colors to make your covers by cutting several screens and printing them in sequence. Another advantage of this type of screen is that it allows the use of water-based inks, making cleanup much easier. Cleanup is very important if your screens are to last throughout the printing run.

Procedure

1. Check the master from Activity 6, and make a very good photocopy of it.
2. Put the photocopy between the screen film and the backing. The film is blue, and the backing is white. Be sure that you center it and that it is face up between the screen and the backing. You must have about a one-inch area around the design to mount the screen to the frame. If not, reduce it slightly on a photocopier.
3. Have the editor or teacher double-check it for you. Do not waste screens if you can help it. They are expensive.
4. If you are sure you have the master inserted in the screen correctly, set the thermal fax at the maximum heat setting and run the screen through. Lift a corner gently and check to see if the cuts were good—if not, run it through again. This will only work if you only lift a corner. You will get a double cut if you have detached the entire screen and try to rerun it, so be very careful.
5. Use double-sided tape to mount the screen to the frame. In addition to the double-sided tape, also apply masking tape to both sides—this helps the screen to last longer and prevents ink from coming through at the edges. Be very careful to get the screen mounted flat and tight.
6. Mount the frame to a backing board made of hard board, and put register marks on it with masking tape for the cover or title page so you will get the paper in the same place each time.
7. Lift the screen and place the material to be printed underneath.
8. Apply a thin line of ink to the top edge of the screen and squeegee it through, holding the squeegee firmly and at about a 60° angle to the screen.
9. Check to make sure that you are getting a good clear print that is square. If not, readjust it and try again until it comes out correctly.
10. If you are using several colors of ink, you will need to do the above steps for each color and wait for the print to dry in between colors.
11. Check the quality at every step.

Evaluation

1. Group participation
2. Checking each step
3. Accuracy of screen print

Support Materials

- Graphic communication text
- Communication technology text
- Printing text

ASSEMBLY AND QUALITY CONTROL

Essential Elements: Common: 2C, E, J
Specific: 1, 7
TAAS Objectives: None

Activity Summary
In this activity, the student learns to assemble, staple, and check the quality of the finished product for final distribution.

Teaching Tips
1. Be very organized at this point because it is very easy to get pages out of order and ruin the entire appearance of the book.
2. Have a large table on which to assemble the product.

Instructional Strategy
- If you did not collate the pages of the book in Activity 7, now is the time it must be done.
- Lay out the pages, title page, and cover in the order in which they will appear in the book.
- Demonstrate how to collate the pages and the title page and the cover.
- Stress accuracy and quality control—checking as you collate for printing errors and misaligned pages.
- Discuss the importance of quality control in both the classroom and in industry.
- Assemble the book, and staple along the edge.
- Padding can be used as a binding method if your book is thick enough.
- Discuss bookbinding methods.

Equipment/Supplies
1. Printed books, cover and title page
2. Stapler
3. If padding the book, padding cement

Evaluation Key
1. Group participation
2. Checking each step
3. Accuracy of collation
4. Quality of pages assembled
5. Final product

ASSEMBLY AND QUALITY CONTROL

Assemble and check for the quality of your storybook.

Objectives
- To develop an understanding of bookbinding methods
- To produce a bound book
- To work in a group

Vocabulary/Concepts Reinforced
- Bookbinding
- Padding
- Saddle stitch
- Side stitch

Equipment/Supplies
- Printed books, cover and title page
- Stapler
- If padding the book, padding cement

Introduction

To assemble your book, you will need to combine the pages, cover, and title page into the order that they will be read. This is called collating the book—putting it in the proper order. Once it is in order, you must bind it to keep it together. Depending on whether you used a full sheet of paper, folded sheets, or a large number of small sheets of paper, the method of binding will vary. For full sheets, a side-stitching method would most probably be used. A thin metal wire cut and folded into a staple along the edge of the page is called side stitching. It is easy and inexpensive. If you have a large number of sheets 1/4 inch thick or more, padding would probably work well. Padding is the use of a plastic glue that dries flexible, like a note pad might be made from. It is also inexpensive but messier to do than the side stitch.

Procedure
1. Collate the pages, cover, and title page.
2. Check the quality of each page as you collate them.
3. Staple the edges together, using a staple at the top, bottom, and in the center.
4. Make sure that the staples are well in place.
5. Check the final assembly, and have the editor or teacher check your work.
6. You are finished. You published a book! Congratulations!

Evaluation
1. Group participation
2. Checking each step
3. Accuracy of collation
4. Quality of pages assembled
5. Final product

Support Materials

- Graphic communication text
- Communication technology text
- Printing text

PRINTING METHODS: A COMPARISON

Essential Elements: General 7A; 8A, C, F; 9A-C
Specific 1, 4, 7
TAAS Objectives: Language Arts: RC 1, 2, 4, 5

Activity Summary
This activity presents a comparison of printing methods, including relief, screen printing, and intaglio, to provide the student with an introduction to printing as a means of communication.

Teaching Tips
1. Point out the proliferation of printed matter in our world. Establish that this is a relatively recent phenomenon.
2. Begin with raised or relief printing. Examples of relief printing are plentiful so have some available for display. Have the students find other examples to share with the class.
3. This form of printing will require the use of cutting/carving tools. Teach safe tool handling and use. Keep all tools sharp!
4. A bench hook for each student is very useful for securing the material for carving.
5. You should have smooth, distortion-free surfaces. Paper with a dull or matte surface works better than glossy finished paper. Read the labels on your inks. Have the appropriate solvent and plenty of rags on hand for cleanup. Discuss with students the dangers of solvent on hands, clothing, vapor, etc. Be certain to cover spontaneous combustion.
6. With screen printing, have an ample number of clean screens ready and available (if possible) to meet your needs.
7. Using plexiglass or acrylic as a plate for intaglio is workable, but a poor choice. The best available materials are sheet zinc or sheet copper, but these are very expensive. A very good alternative material is the plastic used for X-ray film. The film emulsion is recycled, leaving a slightly tinted heavy gauge plastic sheet that works well for this application.
8. For intaglio, use a soft pliable paper.

Instructional Strategy
Encourage students to keep image designs simple. Remember, this is an activity that students can always return to, to create more intricate work.

Equipment/Supplies
1. Linoleum or wood block
2. Pencils or fine line marker
3. Carving tools (gouges, knives, chisels)
4. Bench hook
5. Two brayers
6. Ink
7. Paper
8. Silk screen
9. Masking tape
10. Screen squeegee
11. Plastic sheet (X-ray)
12. 16d nails

13. Ditto masters
14. Thermofax

Evaluation Key

1. Can the student identify the various printing methods?
2. Can the student compare the types of printing?
3. Can the student compare the types of printing in terms of historical development of printing?
4. Can the student compare the types of printing in terms of technical distinction? Can the student express these results and comparisons in written form as asked?

PRINTING METHODS: A COMPARISON

Learn about and be able to compare the basic methods of printing.

Objectives
- To gain an understanding of some of the more common printing methods and their application

Vocabulary/Concepts Reinforced
- Relief printing
- Image
- Planographic
- Lithography, silk screen
- Intaglio
- Brayer
- Squeegee
- Bench hook

Equipment/Supplies
- Block to carve on
- Pencils or fine line marker
- Carving tools
- Bench hook
- Brayers
- Printer's ink
- Paper
- Silk screen
- Masking tape
- Screen squeegee
- Plastic sheet
- 16d nails

Introduction
Printing is the art of transferring an image from one surface to another. How we achieve this transfer is the topic of this discussion. There are basically three types or methods of effecting this transfer: (1) from a raised surface, (2) from a flat surface, and (3) from a recessed surface. All basic printing methods or styles are derived from these three and their subgroups.

Raised Surface (Relief Printing)
All printing from a raised surface is relief printing. It is the oldest form of printing known and was practiced as handprints (hands painted or dipped in color and pressed on the walls of caves by prehistoric peoples). The first type of printing that could be said to use any type of technology would be printing from a carved wood block, dating to the 6th century B.C. Woodcuts were made in the Middle Ages or earlier in both Europe and Asia and were used for depicting everyday life, religious images, and playing cards. By the 15th century they were often used to illustrate books and the Bible. Development continued, but the emphasis changed with the discovery of the intaglio printing method. Relief printing was also used to print not only the picture images, but the words of communication. Initially all printing

presses used the relief method. All letterpress methods used type, either as an entire carved page or individual movable type. The process is relatively unchanged today, although images may now be machine-produced.

Flat Surface (Planographic Printing)
Planographic printing is perhaps the most varied form of the three basic types. Essentially, any flat surface method fits into this category. Some are well known to us; others are not. These methods include (1) lithography, (2) silk screen, and (3) spirit duplicating (ditto).

Lithography is based on a simple premise: oil and water don't mix. On a surface (stone, zinc, aluminum, paper), an image is placed by drawing or photographic method with a grease or grease-based substance. The surface is then wet with water and inked with a greasy ink. The ink will not adhere to the wet surface, but will adhere to the grease image. As paper comes into contact with this surface, a transfer of image occurs.

In screen printing, a very fine screen (usually silk) is treated so that all of the pores in the screen are blocked or filled everywhere, except on the area of the image. If a surface to be printed is placed in contact with one side of the screen, and ink is forced through from the other side, only the area of the image will allow ink through and an exact copy of the image is transferred. This method is often used to print on round objects, T-shirts, etc.

Anyone who has ever been in school has seen, if not used, spirit duplicating materials. Commonly referred to as "ditto" machines, they transfer images from a flat surface to a flat surface. An image or master is made on a piece of paper backed with a sheet with aniline dye. The dye is pressure-sensitive and is transferred to the back of the master as the image is typed or drawn on the master. This creates a negative image of the master on the back of the master. The negative image on the dye is exposed to spirit duplicating fluid vapor and is activated. When this negative activated image is placed in contact with another material, the image transfer occurs.

Recessed Surface (Intaglio)
This method of printing is typical of high-quality, photographic reproductions. In intaglio, an image is incised or cut into a plate surface, usually copper or steel. The plate is then covered with ink, filling all the cuts of the image. The surface is then wiped clean, leaving the image cuts full of ink. The plate and the stock are then pressed together, transferring the image from the plate to the stock.

It must be noted that, in all cases, when the image is transferred onto a surface, the final image is a negative image. All letter printing must be backwards so as to transfer properly or be transferred twice so that the final image is correctly oriented.

Procedure
What you will do is experience some of the printing methods we have discussed.

1. **Relief printing**
   Take a piece of linoleum or a block of wood. Draw an image on this material. It may be block lettering, a nature scene, a person, etc. Carve away everything except the image. It does not need to be deep, just enough so the image surface is raised above the background. Using a brayer, apply ink to the raised surface. Place a clean piece of paper on the inked surface, being careful not to let the paper slide or shift. Roll a clean brayer over the paper to ensure good contact. Remove the paper carefully, and the image is printed.

2. **Screen printing**
   On a clean screen, lay out an image using masking tape. The tape will serve to block the passage of ink through the screen. Place a clean sheet of paper under the screen. Squeegee a small amount of ink over and through the screen. Carefully lift the screen off the paper. Lift the paper with the printed image, and set it aside to dry.
3. **Intaglio**
   On a sheet of plastic draw an image. Go over the image with a sharp, hard instrument (a sharp 16d nail will work). Cover the areas you want dark with many scratches, the light areas with fewer scratches. Apply ink to the entire surface, taking care to fill all the scratches. Squeegee the surface, leaving the ink in the grooves but being certain that the flat surface is clean and devoid of all ink. Place a clean sheet of paper on the plate, and roll a clean brayer over the back of the paper keeping an even pressure. Carefully remove the paper, and set it aside to dry.

Evaluation

Take the three images produced, and compare them to each other for quality of reproduction, ease and/or difficulty in preparing the plate, and the time involved. Is one method better than another in certain applications? Why? What conclusions can you reach as to your application of printing as a medium of communication?

CELLULAR TELEPHONES

Essential Elements: Common: 3A, 6B, 7A-D, 8A, 9C, 10C
Specific: 1, 2, 9, 10
TAAS Objectives: Mathematics: C 2, 4; O 1, 3; PS 1, 2, 4
Language Arts: RC 1, 2, 4, 5

Activity Summary
This activity is designed to provide the student with a working understanding of a communication system that is quickly becoming a major contributor to daily leisure and business use of electronic communications.

Background
Since WW II we have had the advantage of mobile telephones. The first units were large and awkward by today's standards. The system worked by routing all mobile phone calls through an operator over radio channels. These channels were limited (by today's standards) to a single transmitter site that served an entire urban area. This system was crude, time-consuming to operate, and had high background noise.

Improved mobile telephone service (IMTS) was put into service in the 1960s. This improved system eliminated the need for the operator by substituting an automated dialing system. The system still worked through a single transmitter site, still had limited access to channels, and could be eavesdropped on by anyone monitoring these channels. By the end of the decade, the demand for mobile communications far exceeded the supply.

Trunking was the system developed to eliminate many of the earlier problems. It still incorporated automatic dialing, yet it had the availability of the use of new channels allocated by the FCC. Trunking was known as SMR (special mobile radio) and had the advantage that other system users could not overhear other conversations. Trunking still had two major drawbacks: (1) It still could use only a single transmitter per city, and (2) it had a very limited access as to the number of phones that could operate in a given area.

Enter cellular phone technology. Cellular systems have many advantages and eliminate most of the disadvantages of the earlier forms of mobile communications. It has a high degree of privacy, much improved audio quality, and improved channel access/automatic dialing. But how does it all work?

As you remember, all other previous systems worked off a single transmitter site/city. Cellular systems work by breaking a given area, city or rural, into a number of cells. Each cell is itself centered around a single or separate transmitter site. Each cell is adjacent to another cell. These cells are interconnected by telephone and radio equipment housed at the transmitter site.

To make the system work, these individual cells must be connected so as to allow communication between cells. This is accomplished by telephone lines to a control computer and appropriate equipment to switch the calls. This computer/switching equipment is located at a mobile telephone switching office (MTSO). The MTSO sites control the remote sites, as well as run periodic checks to be certain that everything is operating properly. It is capable of alerting an operator to potential

problems. The MTSO is the "brain" of the system in that it connects and disconnects calls, calculates airtime for billing, and routes calls.

Cellular systems operate on two frequency bands in the 800 megahertz range. These are labeled "A" and "B" respectively. The "A Band" is delegated to private use, or in other words, those companies that are not "the phone company." The "B Band" is obviously for the use of the phone company.

The working parts of the cellular system are as follows:

1. The control unit, or CU, is what the user commonly thinks of as "my telephone."
2. The transmitter/receiver unit, or TRU, is generally mounted in the trunk of the vehicle and is the actual radio that communicates with the system. It also contains the onboard computer that controls and monitors the unit's functions. The TRU must be connected to the antenna to enable it to function. But before the unit can function, it must first be programmed with information to make it operational. This programming will include the identification number of the system within which the unit will operate, the unit's telephone number, and the unit's electronic lock code.
3. The mobile communication unit communicates through the individual cell within which it is traveling. These cells or transmission sites are connected with the MTSO.
4. The MTSO is connected with the main telephone communication system. This is the basic cycle of a cellular mobile telephone call.

Teaching Tips

1. It may prove to be an advantage to get the students thinking in such a way as to stimulate the application of what has happened to this point. To achieve that end, you might try asking the students the questions below and have them form an hypothesis based on material already covered. You may then compare these to the answers provided.

   Question

   Is there a limit to the number of mobile cellular phones that can operate within a given area?

   Answer

   Yes and no. The *yes* is that there is a definite number of phone calls that the equipment can handle at any given point in time. The *no* is that each cell has the technical ability to be split into smaller cells indefinitely, provided that sufficient equipment is available *and* installed. This will effectively reduce the area of an individual cell to a proportionately smaller area, thereby reducing the possible number of mobile units operating in the area.

   Question

   How does a person actually place a phone call?

   Answer

   The unit must be placed in the "on" position. The user dials the number on a touchtone dial face, which shows on some type of LED display. The user checks the number for accuracy. The user presses the "send" button, which initiates the transmission of the call to the local cellular station. This station is connected to the MTSO, which in turn is connected to the main telephone company.

   Question

   What are the costs associated with the operation of a cellular phone?

   Answer

   The costs associated with the use of a cellular phone are (1) the cost of the unit itself; this may be an outright purchase, a lease, or a lease purchase; (2) a monthly service charge; and (3) a per minute charge on *all* calls, both incoming and outgoing.
2. Can you come up with some questions of your own? Consider questions you yourself have had, and see if you and your students can find the answers together.

Instructional Strategy

- It may be impossible to have an actual working cellular phone in your classroom, but probably some of your students have seen or even used one. Have these students describe the operation of the unit. As time goes by and as these units become more plentiful and less expensive, cellular telephones may become as commonplace as microwave ovens.
- Fields trips to cell sites and MTSOs may prove of little interest as there is very little to actually see.
- It may be of some benefit to get an industry representative to come talk with the class as a follow-up to this activity.

Equipment/Supplies

1. Chalkboard
2. Handout
3. Actual working cellular telephone unit (if possible)

Evaluation Key

Evaluation should be based on students' understanding of (1) significant developments in cellular communications, (2) the terms *CU*, *TRU*, and *MTSO*, (3) the frequency bands used, and (4) the procedures for actually sending a phone call.

Support Materials

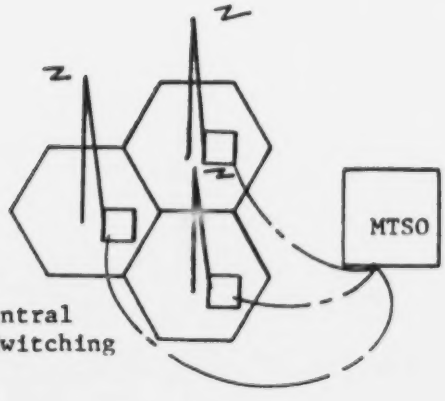
Information Package
Cellular One
Two Park North
8240 Mopac, Suite 340
Austin, Texas 78759

Cellular Installations & Accessories, Inc.
9705 Burnet Rd.
Suite 312
Austin, Texas 78758

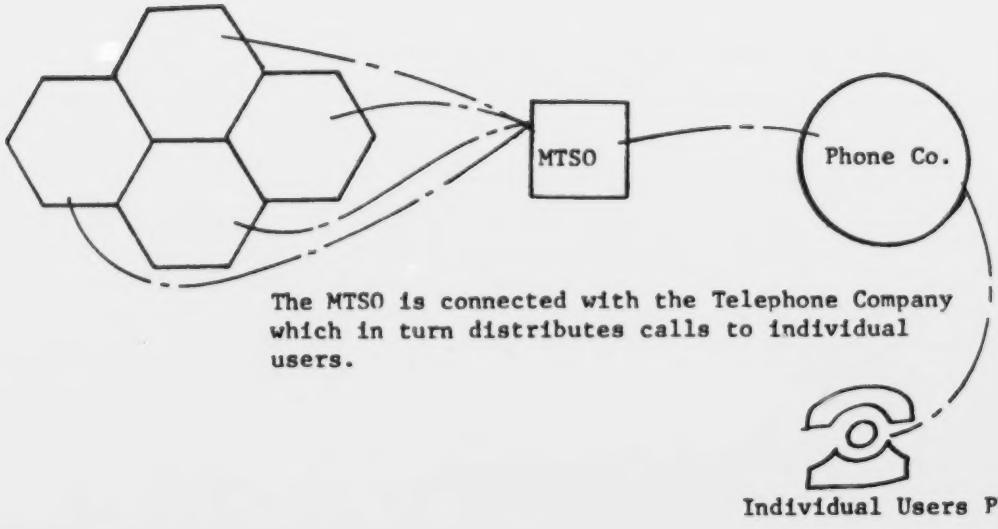
Southwestern Bell
Product Planning Office
7486 Shadeland Station Way
Indianapolis, Indiana 46256

Motorola Communications & Electronics, Inc.
"Cellular Systems Engineering"
11044 Research Blvd.
Austin, Texas 78731

Singular Cell Site



Individual Cells are connected to the "Central Mobile Telephone Switching Office"



The MTSO is connected with the Telephone Company which in turn distributes calls to individual users.

Individual Users Phone

CELLULAR TELEPHONES

Learn about the parts of a working cellular communication system to understand how cellular telephones function.

Objectives
- To gain a working understanding of cellular communication systems and be able to identify all working parts of the system

Vocabulary/Concepts Reinforced
- Mobile telephone
- Cellular
- Radio
- Cell
- Control unit
- TRU
- MTSO
- Transmission

Equipment/Supplies
- Notebook
- Handout

Introduction
Cellular telephones are quickly becoming as commonplace in our daily lives as the conventional telephone. We see the little squiggly antenna on all types of vehicles. We see executives talking out of their briefcases. We see them everywhere! But how do they work?

Procedure
In this activity, you will track the historical, present, and future development and use of cellular technology. Follow as your instructor leads you through what is certain to become a standard form of communication in the very near future.

Evaluation
1. List three significant developments that make cellular communications possible.
2. Define *CU*, *TRU*, and *MTSO*, and explain how they are interrelated.
3. What type of communication signal does cellular technology incorporate?
4. What are the frequency bands used?

FIBER OPTICS

Essential Elements: Common: 7A-D, 8A, 9C
Specific: 1, 4, 9
TAAS Objectives: Language Arts: RC 3, 4, 6; WC 1-3
Mathematics: C 1, 4; O 1, 3; PS 1-4

Activity Summary
This activity presents a brief history of fiber optics, the basic manufacturing process used, and an overview of how lightwave communications work.

Teaching Tips
1. As the world is constantly being shrunk by the communication systems we use, we need to understand what these systems are, how they function, and what their capabilities and limitations are, with an eye towards better use of the facilities at our disposal. A key figure in the communications systems of today, with an increasing role in the future, is lightwave communications, more commonly known as fiber optics.
2. Let us examine what fiber optics are, how they are produced, why we use them, etc., so that we can better understand the world around us.
3. **A brief historical outline**
   During the late 19th century, Alexander Graham Bell transmitted a telephone signal a distance of 200 meters using sunlight as the carrier. This was the first demonstration of the principles of optical communication. While the principle was sound in theory, it lacked the technology to provide a reliable light source.
   1956: The first continuously operating solid-state *maser* (microwave amplification by stimulated emission by radiation)
   1960: The first continuously operating *laser* (light amplification by stimulated emission of radiation)
   1965: The first time two lasers were phase-locked. This was a major step towards the practical development of optical communications.
   1971: The first time that a semiconductor laser was operated at room temperature.
   1977: The first time that a laser could be produced with an expected life span of one million hours.
   1980: Modified chemical vapor deposition (MCVD) is granted a patent. This process is used in the production of optical fibre.
   1985: 20 gigabit transmission rate achieved.
   1986: 30 kilometers distance without regeneration of an 8-gigabit/second transmission rate is achieved.
   1987: Achieved 372 kilometers without regeneration
   1988: Solution, pulses signal is sent a record 4,000 kilometers without regeneration.
4. **The manufacturing process**
   The manufacture of fiber optic material involves the use of two very toxic chemicals—germanium tetrachloride and silicone tetrachloride. The two chemicals are fired through a jet nozzle at high temperature onto a "seed rod." While the material is in the jet, it is referred to as *soot*. As the rod is raised, a very porous and fragile material called a *boule* is created as the soot forms or attaches to itself. The boule is then processed into a transparent glass rod called a *mother free form*. It is at this stage that the material first takes on the property of having a **specific refractive index**. This means that light traveling along the inside of the rod

bounces off the sides at a fixed or specific angle. This angle doesn't change regardless of the diameter or length of the rod (see fig. 1).

The mother free form is then further processed into a much smaller diameter rod called a *final free form.* This final form is heated and drawn into a continuous fiber filament which is 10 microns thick (less than the thickness of a human hair). The filament is then strenuously tested for quality. In one test, one end of a fiber that is about 3 miles long is secured to a laser light source. Then the intensity of the signal is passed at the opposite end. If the fiber passes, it is ready to be made into cable.

Cable is made of a core of fiberglass, coated with polyethylene, which in turn is embossed with six continuous spiral grooves around the outer surface. Then the fibers are threaded into the spiral core, six in each groove. This is then filled with soft jelly and coated with two containing strips, one fabric and one clear plastic. At this point the cable is given two final protective coatings, one of polyethylene and one of nylon.

Each cable has 36 optical fibers, and it can be produced in continuous lengths to 6 miles long. Each filament in the cable has the potential to carry 30,000 telephone conversations or 64 television stations. Each cable is technically capable of carrying almost 750,000 simultaneous phone conversations.

Instructional Strategy

- It should be noted that this module is going to have to be presented in somewhat of a theoretical form as most schools simply do not have the equipment necessary to fully demonstrate fiber-optic communications. It is, however, possible to provide the student with a sound, working understanding of how fiber optics are produced and applied, and what the future seems to hold.
- Fiber optic information is available for the asking from the manufacturers and users of the equipment. A major developer and source is AT&T/Bell Laboratories. The information available is generally of a technical nature and will have to be read, processed, and put into lay terms.

Evaluation Key

Evaluation should be based on students' understanding of (1) the manufacturing process, (2) what specific refractive index is and how it makes fiber optics possible, and (3) the technological capacities and/or limitations of fiber optics, and how it compares with conventional wire transmissions.

Support Materials

- Fiber Optic Trainers, Broadhead-Garrett Co., 223 South Illinois Ave., Mansfield, Ohio 44905
- Frey Scientific, 905 Hickory Lane, P.O. Box 8101, Mansfield, Ohio
- M.D. Miller, "A Chronology of Selected Contributions to Lasers and Lightwave Communications," by AT&T/Bell Laboratories
- Tingye Li, "Advances in Optical Fiber Communications: An Historical Perspective," *Journal on Selected Area in Communications,* Vol. SAC-1, No. 3, April 1983
- Kevin Compton, "Solution Experiment Breaks Record for Optical Pulse Transmission," AT&T/Bell Laboratories
- James E. Rogalski, "Evolution of Gigabit Lightwave Transmission Systems," AT&T Technical Journal
- Photo/Literature Group, "Information Package—Lightwave Communications," February 1987, AT&T/Bell Laboratories

FIBER OPTICS

Learn about the history, manufacture, application, and capabilities of fiber optics and fiber optic communications.

Objective
- To gain an understanding of the manufacture and application of fiber optics

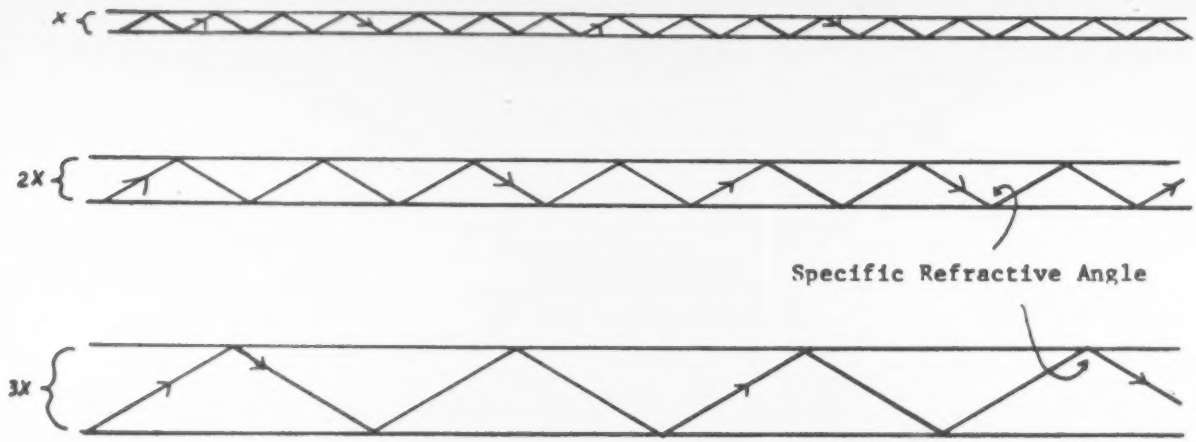
Vocabulary/Concepts Reinforced
- Fiber optic
- Maser
- Laser
- Seed rod
- Boule
- Specific refractive index
- Filament

Equipment/Supplies
- Handout
- Notebook

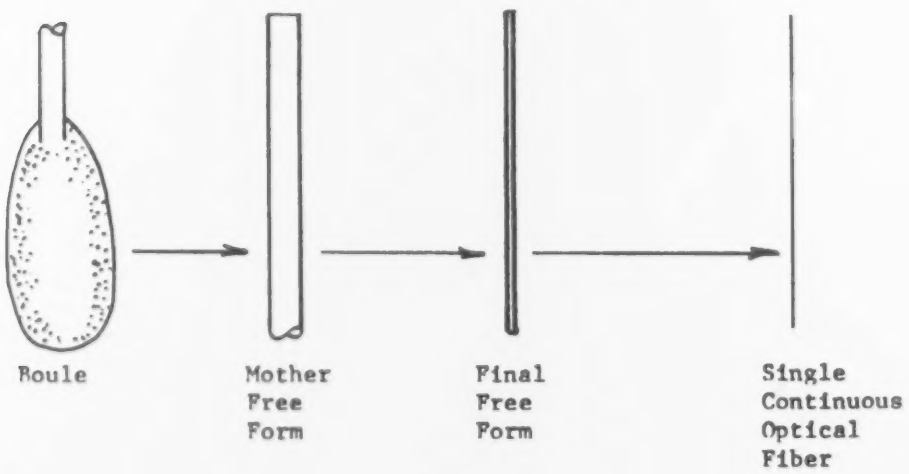
Introduction
It may not be readily apparent, but fiber optics are taking over an amazingly large segment of the transmission chores associated with daily communication. Why, you ask? Let's find out.

Procedure
In this activity you will explore (1) a brief history of fiber optics, (2) the manufacturing process, and (3) some of the applications of fiber optics. Follow your instructor's lead as you track this subject.

Evaluation
1. Write a description of the manufacturing process.
2. Explain what "specific refractive index" means and how it makes fiber optics possible.
3. What are the technological capacities and/or limitations of fiber optics? How does it compare with conventional wire transmissions?



(Fig. 1) Specific Refractive Index- regardless of the diameter of the optical cable, the light traveling along the rod bounces off the sides of the rod at a specific/constant angle



COMPUTER GRAPHICS

Essential Elements: Common: 6, 8, 9
Specific: 4, 6, 7, 8
TAAS Objectives: Language Arts: RC 1-6

Activity Summary
This activity is intended to provide students with an introductory lesson in basic computer graphics using the Paintworks Plus and Paintworks Clip Art Gallery programs on the Apple IIGS computer. Students will be required to produce a full-page, computer-generated graphic design using the drawing tools, clip art, and text in their designs.

Teaching Tips
1. Read through the entire activity before assigning it to students. If you have not used the Paintworks program before, you will find that it is very user friendly.
2. When your students have finished their designs, you may, if you wish, videotape the designs from the computer through the video port on your computer. The designs can then be saved for presentation or evaluation purposes. Sound can also be added by connecting an audio source such as a tape player to the VCR.
3. Encourage your students to be creative and to spend some time on the computer to learn the capabilities of the program.

Instructional Strategy
- Lecture to present the topic to students.
- Use the demonstration method to instruct students in the operation of the computer and the software.
- Spend some time practicing the copying of clip art from the clip art disk. This process takes a little practice. Avoid using the CUT command because it can permanently remove objects from the clip art disk if you are not careful.
- Use the activity as an individual project or group activity as needed.
- Use a class presentation and discussion to evaluate student designs as necessary.

Equipment/Supplies
1. Apple IIGS computer with printer
2. Color ribbon if available
3. Paintworks Plus graphics software with Paintworks Clip Art Gallery
4. VCR with RCA connector cable
5. Blank 3.5" computer disks and videotape
   (*Note:* Paintworks Plus is also available for IBM compatible computers.)

Evaluation Key
Instructor evaluation of student performance on this activity should be based on participation in and completion of the activity. Depending on how the activity is presented, your evaluation should be based on how each student used the basic program, including the design tools, clip art, and text, in their project.

Support Materials
Instruction manual for Paintworks Plus if needed

COMPUTER GRAPHICS

Use the Paintworks Plus graphic program to design and produce a basic visual design.

Objectives
- To use the Paintworks Plus program to design and produce basic computer graphic designs
- To transfer the computer-generated image from the computer onto videotape for presentation and evaluation

Vocabulary
- Computer hardware—the components of a computer system which usually include disk drives, monitors, keyboards, etc.
- Computer software—the operating system and various programs which cause the computer to function.
- Computer graphics—the generation of graphic designs through computer operation. Computer graphics software programs usually include some capability for drawing, copying clip art, using patterns, font, and text styles, and color selection.

Equipment/Supplies
- Apple IIGS computer with printer
- Color ribbon if available
- Paintworks Plus and Paintworks Clip Art Gallery programs
- VCR with RCA connector cable
- Blank 3.5" disks and videotape

Introduction

This activity is intended to introduce you to the basic operation of the Paintworks Plus graphics software. Paintworks is a very user-friendly program in which you can easily learn some of the basics of computer-generated graphics. The program includes capabilities to generate full-page computer design by using an assortment of drawing tools, text, and clip art.

The field of computer graphics has become an industry in itself with several specialty fields including animation, desktop publishing, computer image enhancement, and illustration work. There is also an entire industry based on computer graphics which we know as CAD, or computer-assisted design. The sophistication of programs and equipment in these areas has become very complex and often requires special training in order to operate the equipment and programs.

Procedure

1. Begin by observing the teacher demonstration of the computer and the program.
2. If you have not worked with a computer mouse before, it is suggested that you go through *Your Apple Tour of the Apple IIGS* tutorial disk. This practice will help you understand the concept of the mouse and make it easier to work with other mouse-operated programs.
3. With your instructor's approval, boot up the Paintworks Plus program, and begin your design. One important point to remember when generating your design is that the screen will only display a portion of the entire page. If your instructor wants you to fill an entire page, you will need to move into each part

of the page by using the HAND icon. You can check your progress by selecting either FULL PAGE or FULL SCREEN from the GOODIES menu. If you are going to record your design on videotape, it is advisable to fit it into the full-screen area rather than the full-page area.

4. As you work with your design, try to use some of the clip art that is available on the Paintworks Clip Art Gallery disk. Clip art designs are predrawn artwork that can be copied from the storage disk onto your design. They can then be modified as you wish by using the drawing tools and patterns in Paintworks. Simply place the clip art disk in the 3.5" drive, and select FILE from the main menu. Pull the mouse down, and click it on OPEN. This command will access the file headings on the clip art disk. You will see several categories listed in alphabetical order such as Animals, Awards, Sports, etc. Practice the COPY command using the lasso on the main menu to move these designs over to your drawing. *Note:* Avoid using the CUT command when copying designs from the clip art disk. If you are not careful with the CUT command, you can permanently cut away designs from the clip art disk.
5. Adding text to your design is very easy. Simply select the "A" from the drawing tool menu and FONT from the top menu. Hold the mouse button down and click on CHOOSE FONT to select a font style and a size that you like. Once selected, simply locate where you want your text to appear and type. If you don't like where it appears in your design, you can easily move it using the lasso icon.
6. As you work with your design, you may find that it will take several class periods to complete. You will need to save your design on a separate data disk for your class. When you finish for the day and are ready to store your design, simply select SAVE AS (the first time) from the FILE menu, and you will be asked to name the file. You can either use your name or give your design a title of its own. After this initial file setup, you can save your design by simply going to SAVE in the FILE menu and your design will be saved on the data disk.
7. When your design is finished, your instructor will ask that it be added to the videotape of designs for your class. The connection between the back of the computer and the VCR is made with an RCA connector. When the connection is made and the TV monitor turned on, you should be able to see the image on the computer monitor. From the GOODIES menu, select SHOW SCREEN, and the image will appear without all of the icons and menu selections. If the hand icon appears on the screen, simply run it out the bottom.
8. At this point you can easily save your design on the videotape. Simply pull your design onto the screen and turn on the VCR to record the image of your design. Let the VCR record for as long as you wish to view it on the TV monitor, which will be about one minute.

Evaluation

Teacher evaluation of your performance should be based on participation in and completion of the project. Additional criteria may be included as your instructor recommends.

DRAFTING FUNDAMENTALS

Essential Elements: Common: 2, 7, 8, 9
Specific: 1, 3, 5
TAAS Objectives: Language Arts: RC 1-6

Activity Summary

This activity is designed to introduce students to basic drafting fundamentals. Students will use some of the basic drafting equipment, materials, and processes used in general mechanical drawing. Students will complete a series of drawing activities from assigned worksheets, as well as from teacher-assigned drawings.

Teaching Tips

1. Read through the activity before releasing it to students.
2. Prepare a bulletin board display that will help students understand the importance of drafting and design in the world of technology.
3. Discuss the use of CAD systems and how they are used in industry to design and draw products. Show a videotape or movie about CAD systems to your students to help them understand their utilization.
4. Provide students with a series of teacher-assigned drawings. Some of these should be made from three-dimensional models if possible.

Instructional Strategy

- Use the demonstration method to present this activity to students.
- Use the student worksheets included in this activity to help present the concepts to students.
- These activities are intended to be used as individual projects.

Equipment/Supplies

1. Drawing boards and T squares
2. Architect's scale
3. Drawing pencils (4H, 2H, HB)
4. 45- and 30/60-degree triangles
5. Drawing tape
6. Drawing paper

Evaluation

Evaluation of student performance will be based on completion of the set of student worksheets. Each worksheet is a progressive step in developing a basic understanding of mechanical drawing. Additional teacher-assigned drawings should also be evaluated.

DRAFTING FUNDAMENTALS

Learn some of the basic fundamentals of mechanical drawing.

Objectives

- To use basic lettering and numbering techniques
- To use specified line quality types to draw a basic mechanical drawing
- To read a basic blueprint
- To be able to draw a basic orthographic drawing showing front, top, and side views

Vocabulary/Concepts Reinforced

- Working drawing—a mechanical drawing that illustrates three views of an object including the front, top, and side views. Generally, a working drawing will include dimensions showing the size and location of each part.
- T square—a parallel straightedge with a T-shaped head that rides along the edge of the drawing board to keep it square to the drawing paper.
- Architect's scale—a measuring instrument with regular inches and scaled measurements for the primary fractions of an inch.
- 30/60-degree triangle—a triangular shape with a 90-degree, a 30-degree, and a 60-degree angle.
- 45-degree triangle—a triangular shape with one 90-degree and two 45-degree angles.
- Drawing pencils—there are many specially designed drawing pencils for creating mechanical drawings. In this activity, you will use the 4H pencil for layout lines, the 2H pencil for hidden lines and lettering, and the HB pencil for object lines and border lines.

Equipment/Supplies

- Drawing board
- T square
- Architect's scale
- 45-degree triangle
- 30/60-degree triangle
- Pencils—4H, 2H, HB
- Drawing tape
- Drawing paper
- Any other drawing equipment or tools as needed

Introduction

Drafting is often said to be the language of industry. Everything that is manufactured or constructed is usually drawn mechanically first by a drafter or designer. With the development of computer-assisted design or CAD systems in the last few years, drafting and design work has taken on a whole new perspective. Now, drafters not only need to know how to use the hand tools of drafting, they also need to be able to use sophisticated computer programs to help them design and draw their work.

Although much of the drawing and design work done in industry is actually drawn on a computer, it is important for students to develop an understanding of basic drafting tools and processes used in all areas of communication graphics. This is true not only for those students who plan to enter the engineering fields but for those who plan on entering one of the many technical illustration or graphic design fields as well. Having a good general understanding of the basic drafting equipment will certainly be an asset to these students.

One thing is very clear, however, in the development of drafting and design skills. The drafter needs to understand several fundamental concepts before being able to draw either on the drawing board or with a computer program. This activity is intended to provide some of these basic fundamental concepts of general mechanical drafting.

Procedure

Complete the following series of basic drafting exercises. The student worksheets will help you understand the use of several common drafting tools and processes.

Part I: Drafting Equipment

Study the diagram, and learn the names of the tools that you will be using. Each has a specific use and should be handled accordingly. Your instructor will talk about these tools, as well as those he or she wants you to know about. In a class discussion of drafting equipment, your instructor will demonstrate the use of each item as necessary.

Part II: Lettering

Lettering and dimensioning are important elements in learning fundamental drafting techniques. Complete the following lettering sheet. Your instructor will demonstrate the proper strokes used to draw the letters and numbers.

Part III: Line Quality and Layout

Another fundamental skill that is important to drafting and design work is developing good drawing habits. One of these is the proper use of line quality. Drafting is, in a sense, the language of industry and should be very neat and orderly in its presentation. After your instructor has demonstrated the use of line quality control, complete the related exercise.

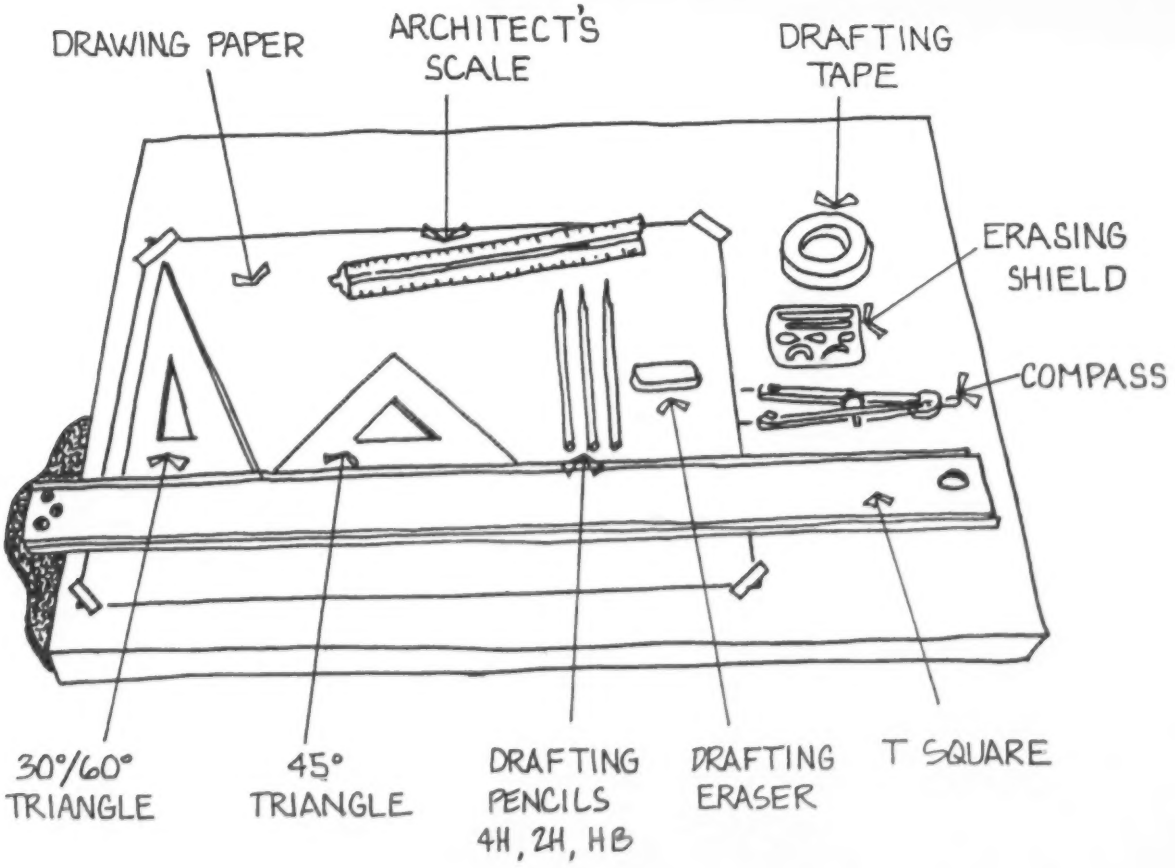
Part IV: Orthographic Projection

Another basic drawing procedure is the presentation of an object in orthographic projection. In this type of drawing, the drafter illustrates an object by drawing its front, top, and side views. Orthographic projection drawings are used often as a plan from which an object can be fabricated. Dimensions are added to these views to either locate a point or show its size. Complete the series of orthographic projection drawings in the student worksheet, as well as those presented by your instructor.

Evaluation

Evaluation of your performance on this activity will be based on completion of the student worksheets, as well as any additional drawings assigned by the instructor. Evaluation will include any additional criteria such as line quality, neatness, etc., that your instructor might establish.

BASIC DRAFTING EQUIPMENT



SAE 1020 CRS BAR STOCK FOR AXLE PIN

FILLETS $\frac{1}{4}$ R, ROUNDS
$\frac{1}{8}$ R, UNLESS NOTED.
BROACH KEYWAY .251+.001 WIDE x .14 DEEP

NOTE: ALL WELDS TO
BE MADE SPEC A20
HELIX ANGLE 7°; ZERO TO MAX LIFT = 3'-0"

SLOT MUST HAVE NO EXTERNAL BURRS

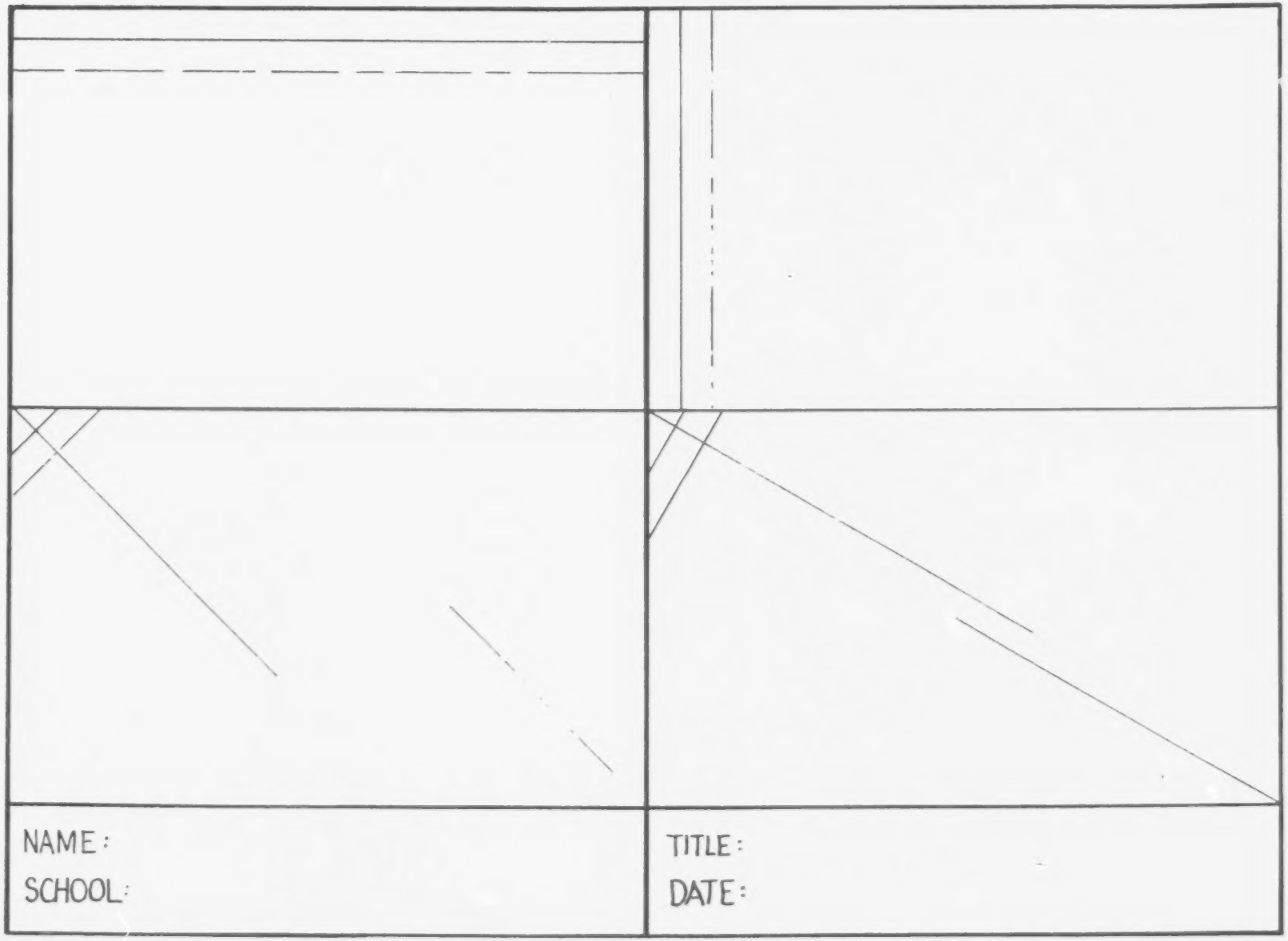
EMBOSS $\frac{5}{16}$ DIA. x $\frac{1}{16}$ DEEP - INSIDE ONLY -

NORMALIZE AT 1600°F FOR 3 HOURS AT STAGE 2

0.135 +.005 PUNCH 8 HOLES FOR NO. 5-40 FIL HD MACH. SCREW

10 SPACES AT 3'-4½" = 33'-9" (ON ℄) LOCATE ALL CONTACT POINTS

NAME:	TITLE:
SCHOOL:	DATE:



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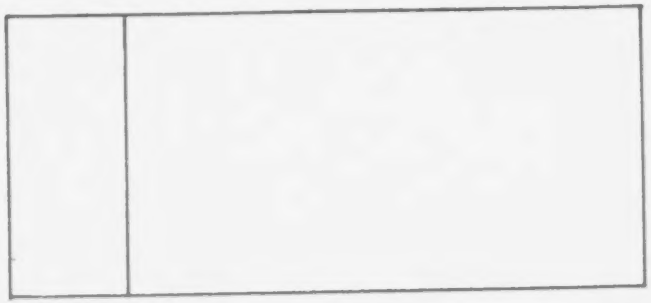

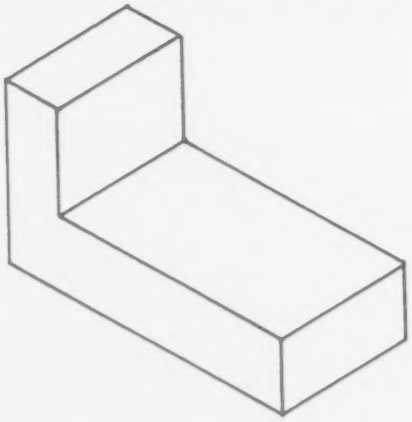

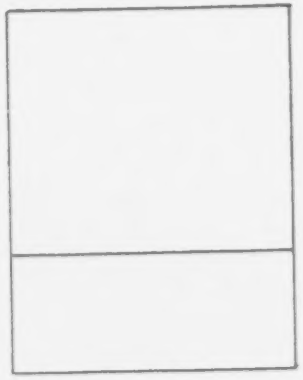

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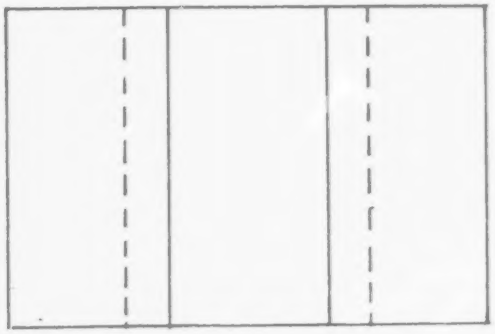

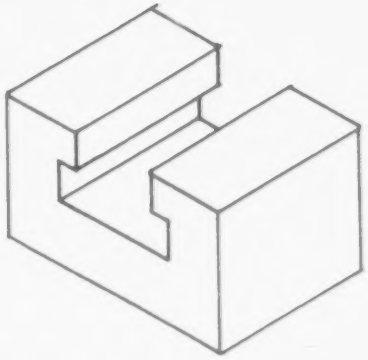

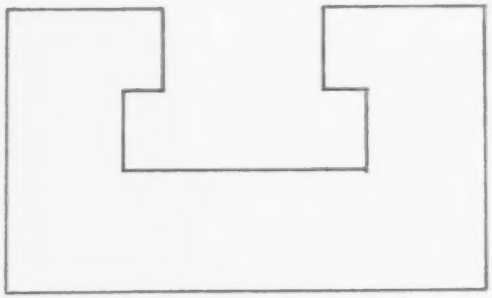

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SCHOOL:

TITLE:
DATE:

NAME:
SCHOOL:

TITLE:
DATE :

BASIC VIDEOGRAPHY

Essential Elements: Common: 1, 2, 6, 8, 9, 10
Specific: 4, 6, 7, 8, 9
TAAS Objectives: Language Arts: RC 1-6

Activity Summary

This activity is intended to provide students enrolled in the Communication Systems course with a project in basic videography. Students will perform several basic operational functions using a camcorder and produce two short productions which they will present to the class for discussion and evaluation.

Teaching Tips

1. Read through the activity and become familiar with the scope of the project before releasing it to students.
2. Stress the importance of videography as one of the primary mediums of communication systems.
3. Become familiar with the various terms used in videography.
4. Obtain some instructional videotapes related to the topic, and make them available for students to watch.
5. Demonstrate the use of the camcorder to the entire class, but also spend some time in small group or individual hands-on sessions to ensure that students know how to properly handle the camcorder.
6. Provide copies of the instruction manual for your camcorder for students to study. This is also a good source for test questions if necessary.
7. Provide copies of the Videography Worksheet for students to use in planning and producing their own video movies.

Instructional Strategy

- Lecture to present the topic to students.
- Use this activity as a small group project.
- Demonstrate the use of the camcorder to students.
- Use the class discussion method to discuss the activity.
- Use student-produced videotapes as an evaluation medium.

Equipment/Supplies

1. Camcorder
2. Blank videotapes
3. Extra camera batteries as needed
4. VCR and monitor
5. Hand-held microphone and tripod, if available

Evaluation

Evaluation of student performance on this activity should be based on participation in and completion of the project. Students should participate in a class discussion and critique of their productions.

Support Materials
Use the owner's manual and other product information sheets included with your camcorder. There are also several commercially produced instructional videotapes that deal specifically with videography.

BASIC VIDEOGRAPHY

Explore the use of the basic video camera and videography by creating your own short production.

Objectives

- To become familiar with basic videography through operating the basic camcorder
- To plan and produce a short video production using basic camcorder handling techniques

Vocabulary/Concepts Reinforced

- Videography: the process of producing video movies with video camcorders and other electronic equipment.
- Camcorder: a portable hand-held video camera that contains the necessary electronic components for recording both video and audio information onto a videotape cassette.
- Backlight function: the control that allows the camera to automatically compensate for high contrast lighting condition.
- Fade control: the control that causes the image to fade out; when a button is pushed, the picture will fade out, and when the button is released, the picture will fade back in to view.
- Lens focus control: most camcorders have both manual and automatic focus control to ensure that a sharp image will be recorded.
- Lens hood: the front part of the lens that protects the surface of the lens from bright sunlight and reflections.
- Zoom lens control: a control that changes the focal length through several focal lengths from wide angle to telephoto view.
- Electronic viewfinder (EVF): a small TV monitor on the camcorder which displays the video image as a black-and-white image.

Equipment/Supplies

- Camcorder
- Blank videotapes
- VCR and monitor
- Hand-held microphone and tripod, if available

Introduction

One of the most important communication tools developed in the last few years is the portable camcorder. Almost all of the primary electronic manufacturers have developed and are marketing some type of camcorder. These small, lightweight, portable, easy to operate cameras are capable of recording high-quality sound and video images on standard videocassettes. These cassettes can be placed immediately into a home VCR and shared with friends. Because there are so many camcorders in the hands of amateur videographers, many news agencies now air footage shot by individuals who happen to record newsworthy events. This was certainly evident during the October 1989 earthquake in California. Although it may not immediately replace still photography as a communication medium, the camcorder certainly has the potential to become a very powerful communication medium.

Because of its importance in the world of communication, it is important for you to learn some of the fundamental handling characteristics of the camcorder. The

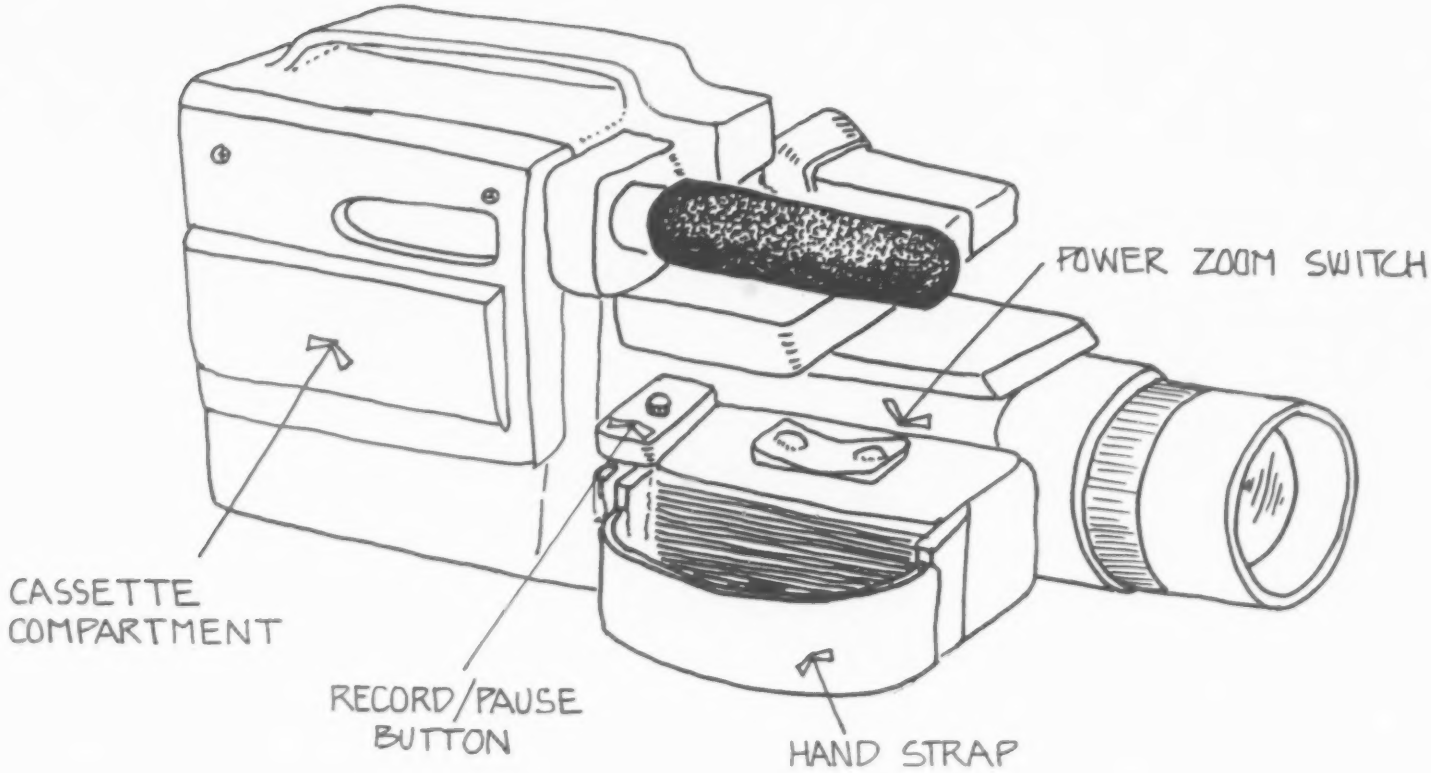
following activities will help you develop a better understanding of these cameras and will provide a set of basic skills you can use to produce more advanced work.

Procedure

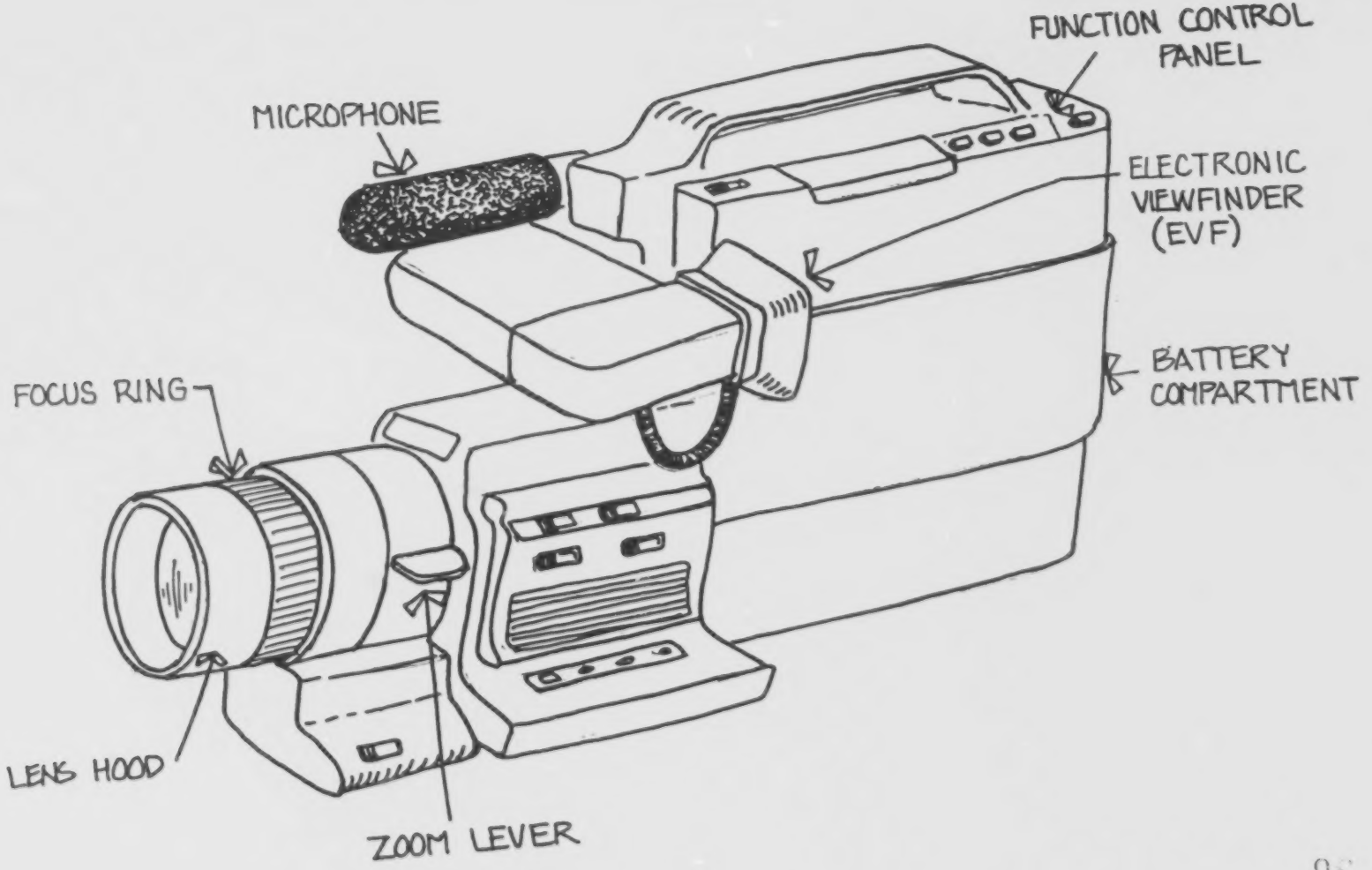
1. Begin by observing the demonstration performed by your instructor on the basic setup and operation of the camcorder that you will be using.
2. Study the illustration of the primary parts and controls, and become familiar with their location and function.
3. Begin Assignment No. 1. This short videography assignment is intended to familiarize you with a few of the basic camera movements that you will use in most shooting sessions. The key to success in handling a camcorder is smooth and relatively slow movement during the shot. Study the worksheet and times for each shot. If you have a color computer that is capable of generating titles, use it whenever possible.
4. Present this first production to your instructor for evaluation. Your instructor may want your group to present it to the entire class for evaluation.
5. Begin Assignment No. 2. Using the camera-handling methods learned above, create and shoot a short production that runs at least 3 minutes. Select a topic that will fit into the time frame for this activity. Try a "how to do it" topic or a "personal interview" topic. Avoid attempting a production that is too complex and time-consuming. You may use the Videography Worksheet as a planner and storyboard. Your group should spend some time planning and organizing the production to avoid delays in shooting. Your instructor will want to approve your worksheet before you begin shooting.
6. When your group has completed the second assignment, present it to the entire class for discussion and evaluation.

Evaluation

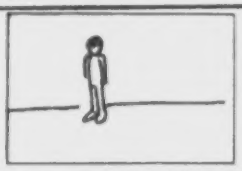
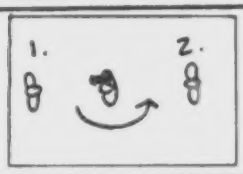
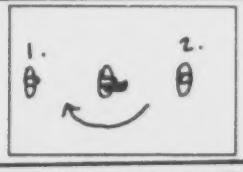
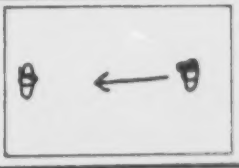
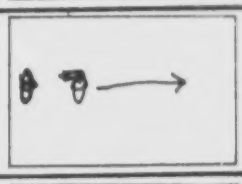
Evaluation of student performance on this activity will be based on participation in and completion of the group assignments. Students will participate in a class discussion and critique of each production.


POWER ZOOM SWITCH
CASSETTE COMPARTMENT
RECORD/PAUSE BUTTON
HAND STRAP

95


FUNCTION CONTROL PANEL
MICROPHONE
ELECTRONIC VIEWFINDER (EVF)
BATTERY COMPARTMENT
FOCUS RING
LENS HOOD
ZOOM LEVER

VIDEOGRAPHY WORKSHEET NO. 1

SHOT	TIME	DESCRIPTION	STORY BOARD
1	30 SEC.	FADE TO OPENING - TITLE	TITLE PAGE
2	15 SEC.	WIDE ANGLE SHOT HAND HOLD LIGHTING AT 45°	
3	15 SEC.	TIGHT SHOT - ZOOM-IN LIGHTING AT 45°	
4	15 SEC.	PAN 180° - SLOW & SMOOTH	
5	15 SEC.	PAN 180° - BACK TO ORIGINAL SLOW & SMOOTH	
6	15 SEC.	DOLLY-IN FROM WIDE SHOT TO TIGHT SHOT	
7	15 SEC.	DOLLY-OUT TO WIDE SHOT FROM TIGHT SHOT	
8	15 SEC	CLOSE WITH ENDING FADE OUT AT END	THE END

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VIDEOGRAPHY WORKSHEET NO. ___

SHOT	TIME	DESCRIPTION	STORY BOARD

PAGE ___ OF ___

VIDEOGRAPHY ASSIGNMENT NO. 1

BY: _____

DATE: _____

SCHOOL: _____

THE
END

PINHOLE CAMERA

Essential Elements: Common: 6, 7, 9
Specific: 4, 6, 7
TAAS Objectives: Language Arts: RC 1-6

Activity Summary
This activity is intended to provide students with a basic photographic project in which they build and use a pinhole camera. The activity is ideal for presenting the basic photographic process. Students will use photographic paper to create a black-and-white negative and a positive print. This activity not only works to present the general photographic process but also helps students understand the concept of exposure control.

Teaching Tips
1. Read through the entire activity before releasing it to students.
2. If you have never made a pinhole camera before, make one and practice several exposures to provide samples for students to view.
3. Use resin-coated paper for easier handling and faster processing.
4. Establish some basic exposure times for students to use.
5. Prepare a display of student work to show their negatives and positive prints.

Instructional Strategy
- Lecture to present the topic to students.
- Demonstrate the activity to students by presenting a step-by-step set of procedures.
- Use this as either an individual or group activity as needed.

Equipment/Supplies
1. Oatmeal boxes
2. Masking tape
3. Tin foil
4. Sewing needle
5. Photographic paper (resin-coated)
6. Processing chemistry (Dektol print developer, Indicator Stop Bath, Rapid Fixer) and trays
7. Black construction paper
8. Contact printer or enlarger for light source to make contact prints from negatives
9. Other darkroom equipment as necessary

Evaluation Key
Instructor evaluation of student performance should be based on participation in and completion of the activity. Students should present their finished positive prints (4x5) mounted on 8x10 mounting board for display.

PINHOLE CAMERA

Learn the basic photographic process from exposure control to producing a negative and a positive print using an oatmeal box.

Objectives
- To discuss the basic photographic process in terms of light-sensitive materials and exposure control to create both a negative and a positive image
- To produce a photographic print using a paper negative
- To mount a finished print for display

Vocabulary/Concepts Reinforced
- Basic camera—a lighttight box with film at one end and a hole in the other end for admitting light.
- Film—a flat surface on which a light-sensitive emulsion is coated to absorb light reflected from the scene being photographed.
- Exposure—the control of the amount of light allowed to strike the film.
- Print—the positive image produced when the film negative is exposed to its light-sensitive emulsion.
- Developer—the chemical agent that causes the sensitized emulsion to turn black, thus creating either a black-and-white negative or a positive.
- Stop bath—the chemical used to stop the action of the developer.
- Fixer—the chemical which removes the unused emulsion that was not exposed to light.

Equipment/Supplies
- Basic darkroom setup with running water and safelight
- Processing chemistry and trays
- Oatmeal boxes
- Masking tape
- Tin foil
- Resin-coated photographic paper (4x5 pieces)
- Sewing needle
- Black construction paper

Introduction

This activity is designed to provide you with a basic project in which you can develop a good general understanding of the photographic process. You will take the basic components of the process and produce a photographic product in the form of both a photographic negative and a positive print. You should pay close attention to the demonstration by the instructor and follow directions accordingly.

Procedure

Stage I—Building and Using the Camera

1. Begin by building your camera. The oatmeal box works very well for the camera body; however, you can use almost any container that can be made lightproof. Study the diagram to see how the camera is constructed. As you begin to build your camera, remember that neatness is important. Sloppy workmanship will result in poor image quality in both the negative and the

positive. Also remember that two very important camera functions are constructed into the pinhole camera, the aperture and the shutter.

2. Cut out about a 1" square in the side of the oatmeal box about halfway between the ends. Cover this cutout area with a piece of tin foil. Try to keep the tin foil as smooth as possible without any wrinkles or folds. Carefully tape the foil in place, being sure to run tape all the way around the foil.
3. Cut out a piece of black construction paper about 2 inches larger than the foil area, and position it over the foil by taping one side so that it can be lifted away from the foil as a flap. Place a small piece of tape on the open end of the flap to keep it closed until you are ready to make the exposure.
4. Using the sewing needle, make a very small pinhole in the middle of the tin foil. Make this pinhole as small as possible. Use only the pointed end of the needle. Remember that the smaller the opening, the sharper the resulting negative will be.
5. In the darkroom, cut several pieces of photographic paper into 4x5 pieces. These will be used as film inside the camera. Load one piece of paper into the camera by carefully taping it against the inside wall of the camera directly opposite the pinhole. Make sure that the emulsion side of the paper, the shiny side, is towards the pinhole. Also make sure that the black construction paper is properly secured over the pinhole and that the lid is firmly in place before leaving the darkroom.
6. Now you are ready to go out and take your first exposure. If your instructor has provided you with a starting exposure recommendation, use it. If you are not sure how long to make the exposure, begin by making a test exposure at 5 seconds. Remember that exposure times will vary according to the size of the pinhole, as well as the amount of light reflecting from the scene. Use the exposure record sheet to keep track of exposure times and corrections.
7. Make the first exposure by setting the camera on a solid object so that it will not move. It is important to hold the camera very still. Also, objects being photographed should remain stationary during the exposure, because any movement in either the scene or the camera will cause the resulting negative to be unsharp. Aim the camera at the scene, and make your exposure by lifting the flap for the designated time; then close it after the exposure is made.
8. In the darkroom, remove the film and place it into the developer tray. Follow the developing time for the print developer that your instructor has provided. Finish the processing steps as required, and evaluate the first negative for proper exposure. If the negative image is very light and little or no detail is visible, the film was underexposed. If, on the the other hand, the image is very dark with little or no detail, the film was overexposed. Your teacher will help you to determine the correct exposure time to produce a good negative. You must have a correct negative in order to produce a usable positive print. It may take you several attempts to produce a good negative with enough detail and density to make a good positive print. Record your exposure times and lighting conditions so that you can duplicate exposures if needed.

Stage II—Making the Positive Print

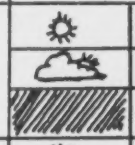
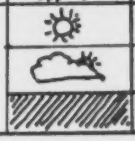
1. Once you have a properly exposed and processed negative, you are ready to produce a positive print. Before you proceed, think about what you have just accomplished. Do you understand why the image created in the film is a negative image of the original scene? What caused this negative image to form?
2. In the darkroom, set up the enlarger so that its lens is wide open and it is projecting light across the entire base board. Locate a piece of clean glass that can be used in making a contact print. Set the enlarger timer for 5 seconds, and turn off the enlarger light.

3. Place one of the unexposed pieces of 4x5 photographic paper with its emulsion side up on the base board directly under the enlarger lens. Place the negative with its image against the emulsion side of the unexposed paper, and lay the glass over them to make a tight contact between the two.
4. Make a test print by blocking sections of the contact print and exposing four sections to 5 seconds of light each from the enlarger light. The resulting exposure will have one section exposed at 5 seconds, one at 10 seconds, one at 15 seconds, and one at 20 seconds.
5. Remove the exposed print to the developer tray, and process according to the directions provided by your instructor. After the test strip has been properly processed, select the best exposure time for your final print. Note that some exposure times will fall between these numbers and all that you need to do is reset the timer for the selected time.
6. Using the selected exposure time, make your final print from the negative, and process it according to the recommended times.
7. Mount your finished print on a piece of mounting board according to the directions provided by your instructor.
8. When all of the members of your class have completed the activity, your instructor will lead a class discussion on the photographic process.

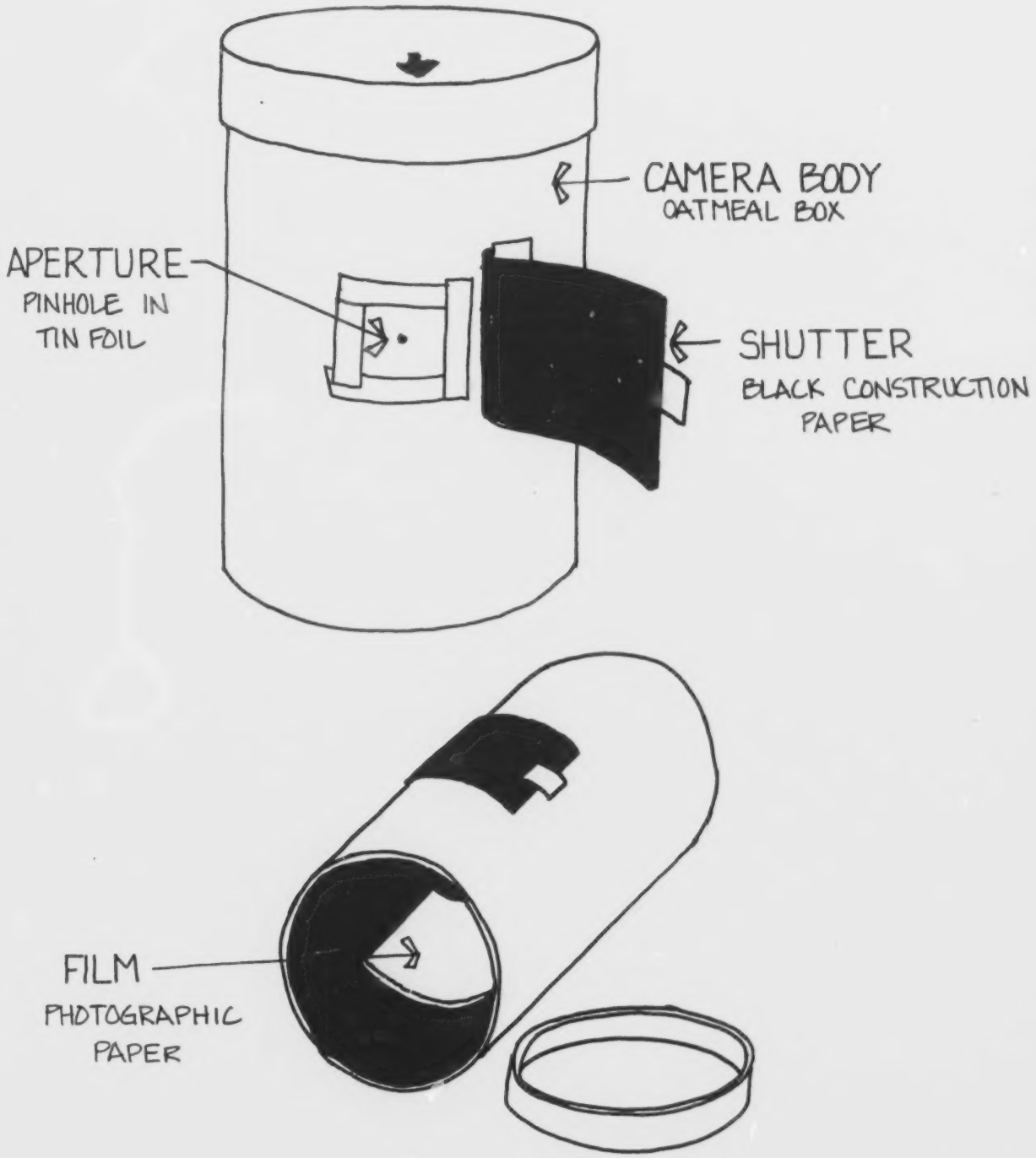
Evaluation

Instructor evaluation of your performance should be based on participation in and completion of the activity. You should also present your finished positive prints (4x5) mounted on 8x10 mounting board for display.

EXPOSURE RECORD-NEGATIVE EVALUATION

EXPOSURE NO.	LIGHT CONDITIONS		EXPOSURE TIME	RESULTS	RECOMMENDED CORRECTIONS
				UNDER GOOD OVER	
				UNDER GOOD OVER	
				UNDER GOOD OVER	
				UNDER GOOD OVER	

PIN HOLE CAMERA



MEDIUMS OF COMMUNICATION

Essential Elements: Common: 7, 8, 9
Specific: 9, 10
TAAS Objectives: Language Arts: RC 1-6

Activity Summary

This activity is intended to be used to present the concept of communication mediums to students in a short one- or two-day lesson. Students will explore various methods of communication including print, television, telephone, voice, recording, data processing, painting, and photography.

Teaching Tips

1. Read through the activity, and become familiar with the topic before presenting it to students.
2. Create a bulletin board display that helps to illustrate the concepts that will be discussed in this activity.
3. Several communication instruments are listed below; demonstrate some of these to students.

Instructional Strategy

- Lecture to present the topic to students.
- Use this activity as either a small group or individual project.

Equipment/Supplies

1. Newspaper
2. Radio
3. Television receiver
4. Computer with printer
5. Hand-held CB radios (two)
6. Flashlights (two)
7. Scanner radio (if available)
8. Several photographs
9. A painting or a copy of a painting
10. Cassette tape and player
11. Compact disc and player

Evaluation Key

Evaluation of student performance will be based on participation in the activity and completion of the student worksheets.

MEDIUMS OF COMMUNICATION

Learn the basic elements of human communication mediums.

Objectives
- To discuss the principle mediums of human communication
- To match both communication carriers and signals to the proper medium
- To identify the products and machines used to support communication systems

Vocabulary/Concepts Reinforced
- Communication—a process by which information is exchanged between individuals through a common system of symbols, signs, or behaviors.
- Sender—the person or machine that transmits the message to the receiver.
- Receiver—the person or machine that receives the message transmitted by the sender.
- Communication medium—the vehicle used to carry the message between the sender and the receiver; may be a newspaper, a radio transmission, a telephone line, or perhaps a signal light.
- Communication signals or symbols—the elements that make up the transmitted message, which may be in the form of printed words, a language, a photographic image, or some other visual or audio signal or symbol.
- Communication vehicle—the carrier of the message, which may be in the form of paper, radio waves, television signals, floppy disks, etc.

Equipment/Supplies
- Newspaper
- Radio
- Television receiver
- Computer with printer
- Hand-held CB radios (two)
- Flashlights (two)
- Scanner radio
- Several photographs
- A painting or a copy of a painting
- Cassette tape and player
- Compact disc and player

Introduction

In our complex world of high technology, communication between individuals and between machines and individuals takes on several different forms. These are called communication mediums and include a variety of things from speaking to photographs. The purpose of any communication medium is to facilitate the communication of a message between the sender and the receiver as efficiently as possible. For the student interested in any form of communication, whether drafting, photography, shortwave radio, or computers, it is important to develop a general understanding of the importance of this process called communication.

This learning activity will present a view of communication through the use of different mediums by discussing the types of signals and carrier vehicles that they incorporate.

Procedure

1. Complete the following worksheets related to communication mediums, and discuss your findings with the entire class.
2. Complete Worksheet 1 by matching the various message symbols or signals with the appropriate communication medium. Also, match the carrier vehicles with the message symbols or signals.
3. Complete Worksheet 2 by listing several products or machines that are used in the communication process for each medium.

Symbols/Signals	*Carrier Vehicles*
Printed words	Paper
Electronic signals	Radio waves
Auditory signals	Wire
Magnetic signals	Sound waves
Visual symbols	Magnetic tape
Computer disks	
Artists' canvas	
Photographic paper	

WORKSHEET 1—COMMUNICATION MEDIUMS

Medium	Symbols/Signals	Carrier Vehicles
ART/PAINTINGS		
COMPUTER DATA/ PROCESSING		
PHOTOGRAPHS		
RECORDINGS		
TELEPHONE		
TELEVISION		
VOICE		

WORKSHEET 2—COMMUNICATION MEDIUMS

Medium	Product/Machine
ART/PAINTINGS	
COMPUTER DATA/ PROCESSING	
PHOTOGRAPHS	
RECORDINGS	
TELEPHONE	
TELEVISION	
VOICE	

DEVELOPMENT OF THE PHOTOGRAPHIC PROCESS

Essential Elements: Common: 7A, 7B
Specific: 4, 6
TAAS Objectives: Language Arts: RC 1-6; WC 1-4

Activity Summary
This activity is designed to give the students some information about the first processes that were used to record a permanent image and some of the individuals who helped make the photographic process successful.

Teaching Tips
1. This activity will mean more to the students if examples of the different processes can be shown. Look under Support Materials to find sources for these images.
2. After covering the information in the lesson, have students identify and discuss the names and processes under Vocabulary. Another way to cover the information might be to have small groups of students select specific individuals or processes to present to the rest of the class.

Instructional Strategy
- Discuss the importance of knowing about and understanding the early processes of recording permanent images in order to gain insight into future possibilities.
- Have students read the activity or do independent or group work to cover the topics under Vocabulary.
- Some of the early processes can be used today, if appropriate care in handling is observed. With teacher supervision, students might try producing an image using an early process. Look under Support Materials for more information.

Equipment/Supplies
1. Reference materials
2. Videotape (if available)
3. Copy slides (if available)

Evaluation Key
Evaluation should be based on the student's ability to recall and discuss the information covered in the activity. Importance should be placed on the individuals—Niepce, Daguerre, Fox Talbot, and Eastman—along with the dates 1826 and 1839.

Support Materials
Examples of the early processes can be found in the following materials:
1. Newhall, Beaumont. *History of Photography*. Boston: Little, Brown, 1982.
2. *150 Years of Photography* (videotape). Rochester, N.Y.: Eastman Kodak Company, 1988.
3. Upton, Barbara London and John. *Photography*. 4th ed. Glenview, Ill.: Scott, Foresman, 1989.

For information and materials for the processes:
1. Photographers' Formulary, P.O. Box 5105, Missoula, MT 59806 (1-800-922-5255)
2. Blue Mountain Photo Supply, Box 3085, Reading, PA 19604.

DEVELOPMENT OF THE PHOTOGRAPHIC PROCESS

Learn about technical achievements of photography, from the early 1800s to the 1930s.

Objective

- To learn about the individuals and the processes that led to the development of the modern black-and-white processes we use today

Vocabulary/Concepts Reinforced

- Sir Thomas Wedgewood
- Camera obscura
- Joseph Niepce
- 1826
- Louis Daguerre
- Heliography
- William Henry Fox Talbot
- Daguerreotype
- Sir John Herschel
- 1839
- Abel Niepce
- Calotype
- Frederick Scott Archer
- Albumen
- Andre Disderi
- Collodion wet-plate process
- George Eastman
- Ambrotypes
- Tintypes
- Carte de visite

Equipment/Supplies

- Reference books

Information

The camera was invented many centuries before scientists had discovered a way to make the images permanent. Eleventh-century Arabian scientists used tents as a *camera obscura,* which means a room that is dark. And in the fifteenth century, Leonardo da Vinci described this dark chamber in detail. By the seventeenth century, the camera obscura was fashioned as a portable chamber which the artist would climb into to use.

The perfected model, resembling the modern reflex camera, had the ground glass attached to the top of the box. The image was projected onto the ground glass by means of a mirror placed at a 45-degree angle underneath it. The artist would trace the image by laying a thin piece of paper over the glass.

The first person credited with attempting to record an image by the action of light was the Englishman Thomas Wedgewood. Just before 1800 he experimented with

paper and leather sensitized with silver nitrate. He was able to form images, but the images were not permanent.

Joseph Niepce, a Frenchman, used a type of asphalt called bitumen of Judea which hardened when exposed to light. He used this asphalt to form printing plates. These printing plates were different from the type that had been used in the past, because the image on the plate was created using light.

In 1826, Niepce made the first permanent photograph using a coated pewter plate. The image was a view of the courtyard outside his home in France. The exposure took eight hours, and as a result sunlight can be seen on both sides of the alley. Niepce called his process *heliography*. In 1829, Niepce joined another Frenchman, Louis Daguerre, in a partnership to develop a process for producing permanent images. The two men worked together until Niepce's death in 1833.

On January 7, 1839, Daguerre announced his process to the French Academia des Sciences. He called his process the *daguerreotype*. It created an immediate sensation and Daguerre won many awards because of the process. The daguerreotype used a silver-plated sheet of copper which was sensitized by placing the silver side over a box of iodine fumes. The fumes reacted with the silver to form light-sensitive silver iodide on the surface of the plate. When light struck the silver iodide, metallic silver was formed. The image became visible when the exposed plate was placed over a box of heated mercury. The plate was made relatively insensitive to light by bathing it in salt water and then washing and drying it.

The daguerreotype dominated photography until 1851. The sharpness and tonal range of the daguerreotype were the key attractions of the process, but there were some disadvantages. The copper plate required very artful polishing, sensitizing, and developing. The image was extremely delicate. The image was unique because there was no way to reproduce it. Also, the mercury vapors were extremely poisonous.

The first daguerreotypes were mainly of architecture, because of the long exposure times. Photographers used the process to produce travel pictures of Europe, the Middle East, and America. Engravers would use the daguerreotype as a model for a copper plate so that copies could be made using conventional graphic arts techniques. The public quickly became disappointed with the lack of people in the pictures. The intense lighting and the long exposures required did not make the process very suitable for portraiture. But in 1840 several technical advances were made that allowed portraits to be recorded.

The first advance was an improved lens produced by Peter Voigtlander of Vienna. His lens formed an image that was 22 times brighter than Daguerre's images. Voigtlander also designed and sold a special camera that looked like a telescope to use with the lens. And in 1840, John Frederick Goddard discovered that by treating the silvered plate with bromine fumes, the light sensitivity of the plates was increased. These two technical advances decreased exposure times from 20-30 minutes down to less than one minute. It was also discovered at this time that the tones of the daguerreotype could be enriched by coating the processed copper plate with a solution of gold chloride. This also resulted in making the image less fragile.

These technical advances caused an avalanche of portrait studios to open. Everybody was having their picture taken. Statistics are rare, but the state of Massachusetts recorded over 400,000 daguerreotypes produced in 1855. Most sitters were posed against a plain background. The lighting was diffused by a skylight or side windows. And the three-quarter-length portrait was the most popular. No one embraced this new process more than the people of the United States. By 1853, there were 86 daguerreotype galleries in New York City alone. Competition kept the prices for a daguerreotype very low. The public was offered daguerreotypes for 50 cents, 25 cents, and 12½ cents. Picture factories could crank out 300 to 1,000 portraits a day.

During the same period that Daguerre was working on his process, William Henry Fox Talbot was also working to perfect a process that would produce a permanent image. His process used paper, rather than a copper plate. Talbot succeeded in producing his first paper negative in 1835, but put it aside to improve the process at a later date. With Daguerre's announcement, Talbot moved quickly and on January 25, 1839, he presented his process to the Royal Institution in London. He named his process *calotype*.

Talbot was not satisfied with the long exposure time required to produce an image on his paper, so he continued experimenting with the process after his announcement. In 1841, he announced that he had discovered that his sensitized paper did not have to be exposed long enough for the image to become visible. A very short exposure to light would cause a reaction in the silver salts. This reaction was magnified thousands of times in the development process.

The calotype process used rag paper which was brushed with a silver nitrate solution and dried. It was then treated with potassium iodide to form light-sensitive silver iodide. The emulsion's sensitivity to light could be increased by brushing it with a solution of silver nitrate, gallic acid, and acetic acid. In bright sunlight, the exposure would take approximately one minute at *f*/11. The image was developed in a solution of gallo-nitrate of silver and fixed in a salt water solution. This formed a negative image which was placed against printing-out paper under sunlight until the positive image could be seen. This negative to positive process is the basis for most modern photographic processes.

Sir John Herschel, son of the famous astronomer who discovered Uranus, and a close friend of Talbot's suggested that Talbot use sodium hyposulfite rather than the salt water. He had discovered in 1819 that hyposulfites would dissolve silver salts. His suggestion to Talbot succeeded in making the images much more permanent. Herschel spent his life as an astronomer, but he was instrumental to photography because of the ideas he generated. In 1840, he demonstrated that a glass negative with a black backing looks positive, anticipating a process that would not be used until 1851. He also discovered in 1840 that silver bromide is the most light-sensitive of the silver halites. In 1842, Herschel invented the cyanotype process, which became the universal method for copying blueprints for the next century. He also coined the terms "photography," "positive," "negative," "emulsion," and "snapshot."

In 1843, Talbot started the first printing house for the mass production of photographs and in 1844 published the first book illustrated with photographs. "The Pencil of Nature" contained twenty-four original calotypes of architecture, still-life arrangements, and works of art.

The chief use of the calotype was in recording architecture and landscapes. The process was never popular in the United States because of the strict licensing requirements Talbot insisted on. He required photographers to pay him to use his process, which many photographers objected to. Talbot died in 1877.

Calotypes have course detail because of the paper fibers and high contrast. They lack the detail and the rich tones of the daguerreotype, but they can be reproduced. Because of the imperfection of the calotype negative on the paper base, glass had been suggested as an alternative base for the light-sensitive salts. The problem was adhering these crystals to the glass. Various substances were tried, including slime from snails, but it took a cousin of Joseph Niepce to discover a partial solution to the problem.

In 1847, Abel Niepce invented the albumen process, which used egg whites to adhere the crystals to the glass plate. These images were very close in quality to the daguerreotype, but there were several drawbacks. The emulsion was easily damaged and was not very sensitive to light. The image quality would also vary depending on the freshness of the eggs.

While the albumen plates quickly were replaced by the invention of the collodion process, albumen paper did become the most commonly used printing material. This coated paper was sold to the photographers by manufacturers who would use factory workers to separate the egg whites from the yolks. The Dresden Albumenizing Company, the largest in the world, is reported to have used 60,000 eggs a day.

Collodion, which is a very sticky liquid that dries into a hard, transparent film, had been discovered in 1846. In 1851, Frederick Scott Archer, an Englishman, announced his invention, the *collodion* process. This process used a glass plate that was coated with collodion and then sensitized with silver salts. Within a decade, Archer's process completely replaced both the daguerreotype and calotype processes. It remained the main photographic process until 1880.

Archer's first efforts with collodion had been unsuccessful. He discovered that his problem was caused by letting the collodion dry before the plate was used. The problems could be overcome by exposing and processing the plate while the collodion was still tacky, thus the popular name for Archer's process—the wet-plate process. The collodion process combined the best feature of the daguerreotype—its sharpness—and the best of the calotype—its reproducibility. And it was more light-sensitive than either of the earlier processes.

Because everything had to be done while the plate was still wet, the photographer had to carry a darkroom around. An amateur photographer might carry a 9" x 11" brass-bound camera, a watertight glass bath holding the silver nitrate solution, a box containing a dozen 9" x 11" glass plates, a box which held lenses, chemicals, and other supplies, a tripod, and a tent to use as the darkroom. The total load would weigh more than 120 pounds.

In the hands of a skilled photographer, the wet plate could capture mood, the sophisticated interplay of highlights and shadows, and texture and details. But the average person was generally only interested in one copy of the image. People were not concerned with the ability to make a large number of reprints. To meet the demand for this market, the idea which Herschel had suggested eleven years earlier was used. Rather than producing a print from the glass negative, black material

would be attached to the back of the glass. This would produce a positive image. *Ambrotypes* were very easy to produce and they could be finished and delivered to customers while they waited. But this process was soon replaced by another adaptation of the wet-plate method—the tintype.

Instead of glass, *tintypes* used thin sheets of iron which were coated with the light-sensitive emulsion. Because the surface was not fragile, they could be sent through the mail, carried in the pocket, and pasted in albums. They were very quick and inexpensive. Tintypes were enormously popular, especially in the United States. Records of family outings, mementos of friendships, and stiffly posed portraits were all common subjects for tintypes. Hundreds of thousands of young men posed stiffly in their new uniforms before going off to fight in the Civil War.

But neither the ambrotype nor the tintype meant the death of the daguerreotype. Instead it was the *carte de visite*, patented in France in 1854 by Andre Disderi. These 2 1/4-by-3 1/2-inch portraits were made with a wet-plate in a special camera with four lenses. Four exposures were made on each half of the plate, producing eight different images. Disderi made this system of mass production portraiture world famous. Disderi's reputation reached its height in 1859 when Emperor Napoleon III, leading his troops out of Paris on the way to Italy, stopped in front of Disderi's studio to have his carte de visite photograph taken.

By the mid-1870s, everyone had either been photographed or had at least seen a photograph. But the process was still too cumbersome and expensive for anyone but a professional photographer. The first development that changed this was an emulsion based on gelatin, rather than collodion. Gelatin is the jellylike substance that is processed from cattle bones and hides. This emulsion would retain its sensitivity to light even when dry, and more importantly, it could be applied to a flexible backing, such as rolls of paper.

Roll film revolutionized photography by making it simple enough for anyone to enjoy. But much of the credit for popularizing photography can be credited to George Eastman. Eastman invented the equipment to manufacture film on a mass basis. "Eastman's American Film" was a roll of paper coated with a thin gelatin emulsion. Because the separation of the emulsion from the paper backing was a delicate process, the film was usually sent back for processing to the Eastman Company in Rochester, New York.

The introduction of roll film did not mean that much to the average person, because the heavy and expensive view camera was still necessary for taking pictures. All this changed in 1888 when Eastman introduced an inexpensive, lightweight, easy-to-use box camera called the Kodak. The original Kodak was a box 3 1/4 by 3 3/4 by 6 1/2 inches in size. It contained enough film for 100 2 1/2-inch circular pictures.

Eastman's most important contribution, however, was in providing photofinishing service for his customers. The camera was loaded with film when it was sold for $25, but the cost included processing. The customer would expose the roll of film and then send the entire camera back to Eastman. The film would be processed and printed, a fresh roll loaded into the camera and then everything was shipped back to the customer. Eastman's slogan was "You push the button, we'll do the rest."

Eastman used a paper backing the first year, but in 1889 started using a plastic backing for his emulsion. The inventor of this modern roll film, an emulsion on a sturdy, flexible plastic base, was Reverend Hannibal Goodwin of New Jersey. He

had discovered in 1877 that, by taking collodion and treating it, he could form the versatile plastic, celluloid. Eastman was the first to market a celluloid-based film, but in 1914 the courts decided that Eastman's process infringed on Goodwin's process. Eastman was required to pay Goodwin's estate $5 million for patent infringement.

Under Eastman's guidance, the Eastman Kodak company produced the first motion picture film and amateur moviemaking film. Several color processes culminated in 1935 with the marketing of Kodachrome slide film. Ektachrome was developed during World War II. In 1932, at the age of 78, Eastman committed suicide, leaving the message, "My work is done, why wait?"

These are some of the individuals who helped start the process of photography. Many other individuals have helped photography develop a sense of purpose: to document, to express, and to change our perception of the world around us.

Evaluation
Students will discuss in writing the information covered in the activity. Importance should be placed on the individuals—Niepce, Daguerre, Fox, Talbot, and Eastman, along with the dates 1826 and 1839.

LOOKING REPORT

Essential Elements: Common: 2B, 4B, 4D, 10
Specific: 2
TAAS Objectives: Language Arts: RC 4-6; WC 1-6

Activity Summary
This activity allows the student to learn how to evaluate photographs.

Teaching Tips
1. This assignment can be ongoing throughout the school year. Every week students turn in a Looking Report. This ensures that the students are continually looking at visual communication through photographs and other graphics. This provides a good activity on days when the students have some extra time in class.
2. Students select photographs (or other graphics relating to the current class assignment) that they like or admire. These photographs are photocopied and critiqued, using the questions in the student activity as a starting point. If a photocopier is not available, then consider using old magazines. The photographs can be cut out and attached to the critique.
3. This activity is designed to work on visual communication skills and problem-solving skills.

Instructional Strategy
- Lecture to present the topic to the students. Lead the class in a critique of an image to show them how you want them to talk about the photograph.
- Occasionally, you might bring some image into the class and have the entire class write individual critiques of the image, and then discuss their comments.

Equipment/Supplies
1. Books/magazines/other sources for photographs
2. Photocopier

Evaluation Key
Evaluation of the Looking Report should be based on whether or not students have discussed the questions fully and have attempted to understand the photographer's intent.

LOOKING REPORT

Improve your own work by critiquing the work of other visual communicators.

Objectives
- To practice evaluating photographs in terms of composition, lighting, and message
- To generate ideas for future photographic assignments

Vocabulary/Concepts Reinforced
- Writing skills
- Problem-solving skills
- Lighting
- Composition

Equipment/Supplies
- Books/magazines/other sources for photographs
- Notebook paper
- Photocopier

Information

It is important for you to be able to discuss not only your own work, but also the work of other photographers or graphic artists. The best way to improve your own vision and eye for design and composition is to look at other work. The Looking Report gives you the opportunity to select a photograph you like out of magazines, books, or other sources, and then offer a critique of that image. The photograph should be photocopied and accompany your critique. Your critique should include the following points:

- The lighting used:
  Is it artificial or natural? How can you tell?
  How many lights were used if it is artificial?
  What direction(s) is the light coming from?
  What is the quality of the light?
- The composition in the photograph:
  What is the main subject?
  Did the photographer use any design elements or principles? Which ones?
  Is the composition simple or cluttered?
  How did the photographer place emphasis on the subject?
- The technical quality of the image:
  Does the technical quality help or hinder the image?
- What the photographer is trying to communicate in the photograph:
  Persuade the viewer? Sell the viewer? Anger the viewer?
  What is the purpose of the photograph?
  Is the message communicated effectively?

- Why you selected this photograph:
  What is it about this image that attracted you?
  What emotional or physical impact does the image create for you?
  Is there something here that you would like to show in your own work?
  Is it the process, subject matter, camera angle?
- Are there any flaws in the image?
- Any other comments you would care to make about the work.

Evaluation
Critique the photograph provided by your instructor using the criteria in this activity.

TELEVISION NEWS PROGRAM

Essential Elements: Common: 1, 2, 4, 9A
Specific: 1, 2, 4, 8, 9
TAAS Objectives: Language Arts: RC 1-5; WC 1-4

Activity Summary

This activity provides the students with the opportunity to create their own production company to produce a fifteen-minute television news program on videotape.

Teaching Tips

1. Have the students observe some evening news programs and then report back to the class on the different elements of the program (e.g., news, sports, weather, feature). They should also note the average length of time for each story.
2. Showing the students some examples of award-winning commercials, such as the Clio Awards, provides ideas for their own commercials.
3. If the class does not have access to some type of editing system for the videotape, you may want to require that all stories and commercials be unedited.
4. As incentive to the class(es), you might plan on showing the news program during lunches in the cafeteria, or someplace where other students around the school can see your students' work. This is also a good way to make your class more visible.

Instructional Strategy

- Start by having the class discuss or suggest what jobs are necessary for producing a news program. Discuss with the class the responsibilities of each job, and suggest other jobs they might have overlooked.
- Have the class select the producer. This is the student who will be in charge of the entire project. Explain to the class that this is the most important job, and that they should select someone whom they will listen to. One job the producer should have is the responsibility of suggesting grades for each student at the end of the assignment, based on that student's contributions to the overall project.
- Have each student fill out a job application. A sample is included. The students should list two choices from the "A" column and two from the "B" column. "A" jobs are ones which are required first during the length of the activity, while "B" jobs are required later.
- Together with the producer, select the students for the appropriate jobs.
- Assign students into small groups responsible for producing commercials or news stories for the broadcast. Each group should have at least one reporter/advertiser and a camera operator. Some groups might work together to produce several different stories or commercials. The number of groups and the availability of equipment should be used to determine the total length of the program.
- With each student having specific responsibilities, not every student will be operating a camera or editing tape or working on the set crew. The instructor might have each student or each work group report back to the rest of the class, when the production is finished, detailing what their job required.
- Groups responsible for producing news or feature stories for the program should turn in some type of story outline, containing questions they intend to ask, who they will be interviewing,

what they intend to show, etc. Groups producing commercials should turn in storyboards showing exactly what they intend to videotape.

- The instructor should work with each group, offering suggestions for story ideas or products to advertise. With the reporters, it is important to discuss the five Ws, as well as objective reporting vs. editorializing. With the advertisers, emphasize the different ways that advertisers today get their message across—by using mood, music, graphics, action, etc., to make the product appealing.
- Have the producer work on making sure that each group is moving towards their completion date. With the help of the director, have the producer decide on an order for the actual broadcast. It is wise to alternate between a live story (anchors, weather, sports, movie reviews, etc.) and a taped story or commercial. That way there is time to cue up the next story on the videotapes.
- Prior to the final day of the assignment, when the actual taping of the broadcast takes place, the students responsible for the set/lighting/sound should make sure that they know how they are going to set up the studio area, who is bringing which props, who has the station logo drawn up, etc. Planning is a key part of this assignment!
- On the day of the taping, one possible way to set up the equipment is shown in Diagram #1. This allows for the live image to be combined with the taped stories to produce one continuously running broadcast. Radio Shack sells a very inexpensive switcher that allows you to have several inputs and wipe or fade between them.
- It might be wise to schedule the taping for two days, so that the students can practice the show once before taping. Have them experience the real drama of news production by having them tape from beginning to end without stopping the videotape. While hectic, it can be a lot of fun.

Equipment/Supplies

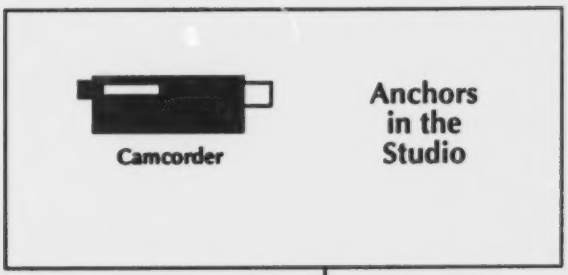
1. Camcorders (as many as possible)
2. VCRs
3. Television monitors
4. Blank videotapes
5. Storyboard forms
6. Examples of news programs/commercials
7. Studio or classroom facilities
8. Props/lighting for set (if required)

Evaluation Key

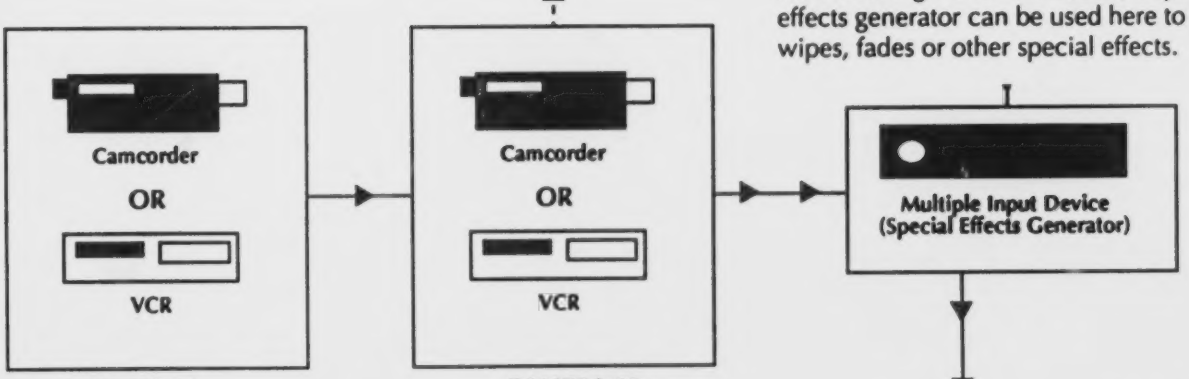
Evaluation of the assignment should be based on the successful completion of the program. Each student receives an individual grade based on his/her contribution to the program (graded by the instructor and the producer) and a class grade. Grades can also be given for the work done before the actual taping (story outlines, storyboards, etc.).

Diagram #1

The camera in the studio is used only to send the picture to INPUT #2 on the Special Effects Generator (S.E.G.). There is no tape in the camera. The camera's microphone can be used to audio dub stories or commercials, if the sound from the camera is run into an auxilary sound input on the back of the S.E.G.

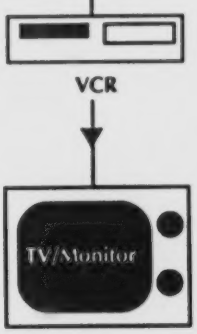


This device allows you to select between two or more inputs. Whichever input is selected is the one that is being sent out to the recording VCR. If available, a special effects generator can be used here to add wipes, fades or other special effects.



CAMERA #1 *CAMERA #2*

These two set-ups are used to cue up the next story or commercial. If a second monitor is available, it can be used to determine the exact point that the tape needs to start playing at. If no monitor is available, the viewfinder monitors on the cameras can be used. Camera #1 needs a video/audio output, Camera #2 needs both input and output. If Camera #2 has both RCA jacks as well as the coaxial cable, run the coaxial into the monitor and the RCA plugs into INPUT 1 on the Special Effects Generator.



This VCR is used to record the final copy of the broadcast, with both the live image and the taped stories on it. The monitor allows you to see exactly what is being recorded on the final tape.

TELEVISION NEWS PROGRAM

Learn what goes into producing a television news program.

Objectives
- To learn about the different people required to produce a successful news program
- To learn how to fill out a job application
- To produce a fifteen-minute news program, containing several minutes of commercials

Vocabulary/Concepts Reinforced
- Writing/speaking skills
- Problem-solving skills
- Five Ws (Who, What, Where, When, Why, and How)

"A"
- Producer
- Director
- Reporter
- Camera Operator
- Advertiser

"B"
- Anchor(s)
- Graphic Artist
- Light/Sound Technician
- Tape Editor
- Sportscaster
- Weathercaster

Equipment/Supplies
- Camcorders (as many as possible)
- VCRs
- Television monitors
- Blank videotapes
- Storyboard forms
- Examples of news programs/commercials
- Studio or classroom facilities
- Props/lighting for set (if required)

Introduction

People around the world are influenced by what they see on television. Television pervades our existence, showing us people and places that 20 or 30 years ago our parents and grandparents had only read about in books. And it is through television that most people gain their news.

While in the past, most citizens gained information about their community, the state, or the country from the newspaper, the television news program has overtaken the newspaper to become the main source of news to the general public. In fact, cable television now boasts several 24-hour news programs, just to help keep people informed about what is going on in the world around them.

Producing a television news program takes a lot of people with a lot of very special jobs. It is not a matter of just sitting down in front of a camera and reading to an audience. It takes planning and organization and enough people in front of and behind the camera to get the news on the air in a responsible and timely manner.

For this assignment, your class will be producing a news program. As a group, you will select the student you want to lead you on this journey. Individually, you will fill out a job application for the specific area you wish to work in. When finished, you will have a fifteen-minute news program that also includes several minutes of advertising.

Procedure

1. After viewing some examples of news programs, and discussing with the instructor the specific jobs that will be required, the class will select their producer. This is the student who will have final authority over the broadcast. You should select someone whom you would be willing to listen to, and who you think is organized enough to successfully guide you to a finished assignment.
2. Once the producer has been selected, you will be asked to complete a job application for the specific job(s) that you are interested in working in. The instructor will give you some guidance in this area.
3. The producer and instructor will "hire" you for a specific job on the production staff. You might be responsible for producing a news or feature story that will run during the broadcast. Or you might be in a group that produces commercials that will be interspersed throughout the broadcast.
4. Story ideas can cover topics such as specific individuals who have accomplished something, won something, or had something happen to them. Places or events can also be covered by the news. What is the difference between a feature story and a news story? The answer may determine the direction that you and your group will take. The key is to select a story that is timely.
5. As an advertiser, you might decide to advertise a product or service that already exists. Or your group might make up something new. The main idea here is to work with something you would find appealing, and then figure out how you could make that appealing to someone else. That will tell you how to sell the product.
6. Planning and organization are vital to a project like this. You have a number of groups that are all working towards a common deadline. It is important that someone knows exactly where each group is, and how their particular assignment is going. This is the job of the producer. Writing, videotaping, and editing must be scheduled so that everyone ends up at the same point on the same day.
7. And don't forget the little things! How is the studio going to be set up? Do you need props? What about the name of the station and the logo? Is the logo going to be seen on camera? Are any other graphics required? Does the weathercaster need a map? These are all someone's job to know and keep track of.
8. If everything is running smoothly, on the day that the actual program is taped, the class will find itself with several tapes of prepared stories and commercials that will be interspersed between live footage of the anchors, the weather report, the sports report, or whatever else the class has decided to include.

Evaluation

Evaluation of the assignment is based on the successful completion of the program. You will receive an individual grade based on your contribution to the program (graded by the instructor and the producer) and a class grade. Grades can also be given for the work done before the actual taping (story outlines, storyboards, etc.).

APPLICATION FOR EMPLOYMENT

PERSONNEL DATA

NAME _____ SSN _____
First M.I. Last

PHONE NUMBER _____

PRESENT
ADDRESS _____
No. & Street City State Zip

PREVIOUS
ADDRESS _____
No. & Street City State Zip

HAVE YOU EVER BEEN CONVICTED
OF A MISDEMEANOR OR FELONY
OTHER THAN TRAFFIC VIOLATIONS? _____ IF YES, EXPLAIN _____

_____

HAVE YOU EVER WORKED FOR A TELEVISION STATION? Yes ____ No ____

ARE YOU UNDER 18 YEARS? IF SO, STATE YOUR AGE _____

WHAT JOBS ARE YOU APPLYING FOR? LIST TWO FROM COLUMN "A" AND TWO FROM "B":

_____ _____

_____ _____

A B

HEALTH DATA

WHAT IS THE PRESENT
CONDITION OF YOUR
HEALTH? _____

HAVE YOU EVER RECEIVED COMPENSATION
FOR ANY ACCIDENT OR DISABILITY? _____
IF YES, EXPLAIN: _____

_____

LIST JOB DUTIES YOU CANNOT PERFORM DUE TO A PHYSICAL OR MENTAL HANDICAP:

_____

EDUCATIONAL DATA		
	NAME OF SCHOOL	YEARS ATTENDED
GRADE SCHOOL		
JUNIOR HIGH SCHOOL		
HIGH SCHOOL		

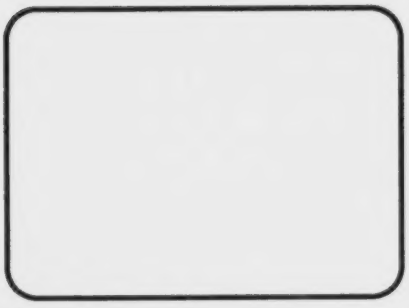
WORK EXPERIENCE DATA						
NAME OF COMPANY AND TYPE OF BUSINESS	FROM		TO		DESCRIBE WORK YOU DID	REASON FOR LEAVING
	MO.	YR.	MO.	YR.		

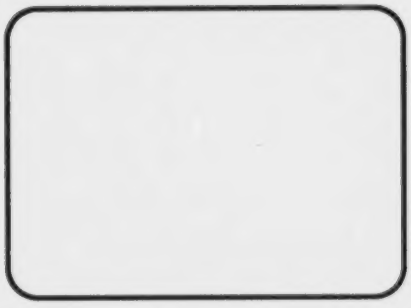
WORK EXPERIENCE DATA						
NAME OF COMPANY AND TYPE OF BUSINESS	FROM		TO		DESCRIBE WORK YOU DID	REASON FOR LEAVING
	MO.	YR.	MO.	YR.		

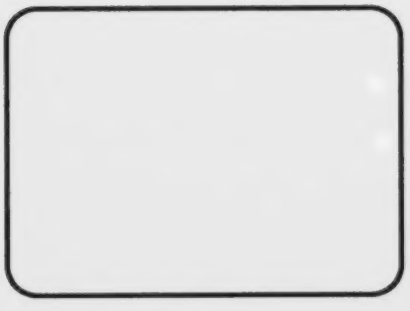
WORK EXPERIENCE DATA						
NAME OF COMPANY AND TYPE OF BUSINESS	FROM		TO		DESCRIBE WORK YOU DID	REASON FOR LEAVING
	MO.	YR.	MO.	YR.		

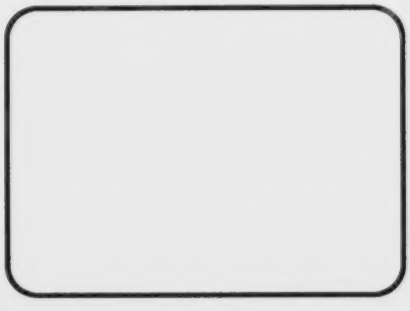
Briefly explain what qualifications you would bring to the job you have requested:

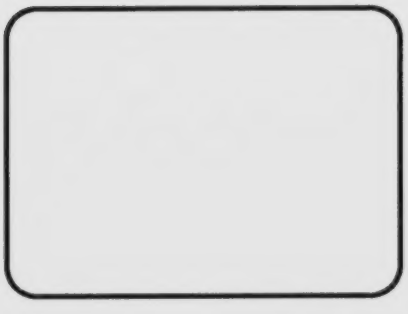
STORYBOARD

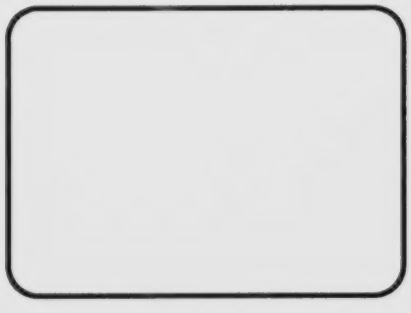












THREE-DIMENSIONAL PHOTOGRAPHS

Essential Elements: Common: 2, 6, 8, 9
Specific: 4, 6, 7
TAAS Objectives: Language Arts: RC 1-6

Activity Summary
This activity is intended to provide teachers with an interesting variation to standard photography projects. In this activity, students will create a three-dimensional photograph using either a series of separate photographs or a single photograph and then stacking multiple images that have been mounted on masonite.

Teaching Tips
1. Read through the entire activity, and become familiar with the topic before releasing it to students.
2. Make one or two samples to illustrate the topic.
3. Review safety procedures for using the scroll saw.
4. Create a display of student work on completion of the activity.

Instructional Strategy
- Use this activity as either a small group or individual project.
- Use the lecture method to introduce the activity to students.
- Demonstrate the procedures to students.

Equipment/Supplies
1. Photographic darkroom with enlarger, processing trays, and chemistry
2. Photographic paper
3. Black-and-white negatives
4. Spray adhesive
5. 1/4" masonite
6. Scroll saw with several fine blades
7. Carpenter's glue
8. Wood bases for mounting photographs

Evaluation Key
Instructor evaluation of student performance should be based on participation in and completion of the project.

THREE-DIMENSIONAL PHOTOGRAPHS

Create three-dimensional photographs from standard black-and-white negatives.

Objectives
- To develop a creative alternative to standard photography
- To develop greater skills in workmanship and project finishing

Vocabulary/Concepts Reinforced
- Visual design
- Visual communication

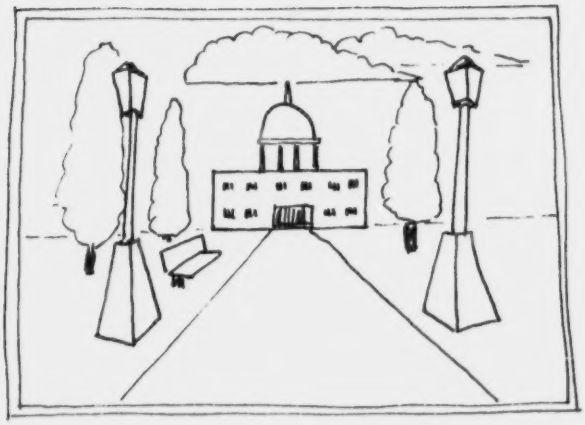
Equipment/Supplies
- Photographic darkroom with enlarger, processing trays, and chemistry
- Photographic paper
- Black-and-white negatives
- Photographic spray adhesive
- 1/4" masonite
- Scroll saw with several fine blades
- Carpenter's glue
- Wood bases for mounting photographs

Introduction
Photography is one of the most important visual communication tools that is used extensively throughout the world. From the time of its development in the early 1800s, photography has been used to communicate interesting stories, faraway places, famous and not so famous people, and a host of other things. One element of photography that has not changed a great deal since its development is that it has remained a relatively constant format; that is, it is usually found in the form of flat photographic prints or in projected color slides. Rarely, however, has photography ventured away from this two-dimensional format.

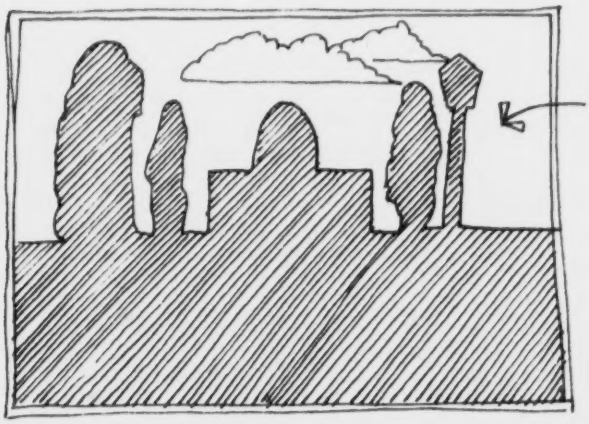
One method that has been used to break away from the standard photographic format of prints and slides is to create a more three-dimensional presentation. The purpose of this activity is to provide you with a variation to the standard photograph by having you prepare and assemble a composite set of photographic images either from one negative or from several negatives in one almost three-dimensional picture. Carefully read through the procedures outlined below.

Procedure
After you have read the above information and have observed the teacher demonstration, follow the steps as outlined below and complete your own three-dimensional photograph.

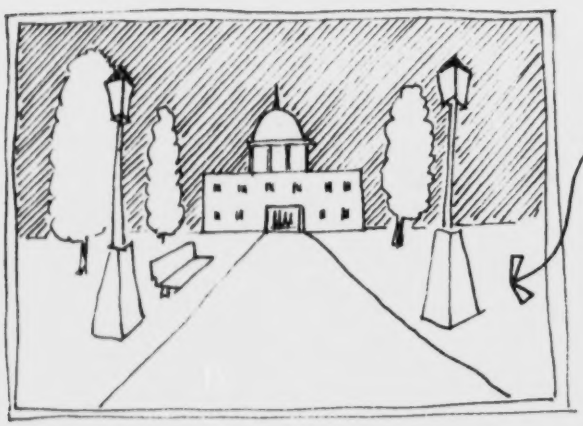
1. Select a negative or several negatives to work with. They should be properly exposed and processed.
2. Draw a basic layout for your design, studying the drawings provided for a variation that will best suit your pictures. After you have completed a basic



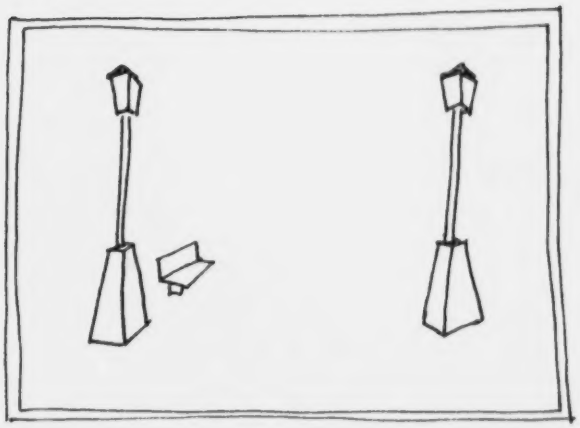
ORIGINAL PHOTOGRAPH



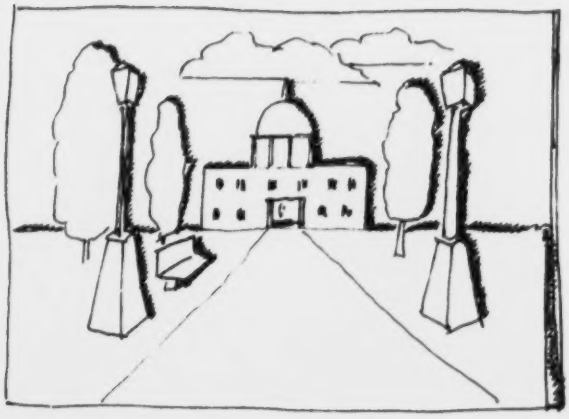
PRINT FIRST LAYER AND
MOUNT ON MASONITE



PRINT SECOND LAYER AND
MOUNT ON MASONITE



PRINT FOR THIRD LAYER
AND MOUNT ON MASONITE



ASSEMBLE THE LAYERS INTO
ONE COMPOSITE LAYOUT

thumbnail sketch, discuss the design with your instructor to make sure that it will work.

3. In the darkroom, print and process the various prints that you will need for making your composite picture. Process them according to the procedures recommended by your instructor.
4. Rough-cut each print as necessary with a pair of scissors.
5. Using the spray adhesive, mount each print to a piece of masonite. Spray the adhesive onto the smooth surface of the masonite. Make sure that the prints are pressed down evenly onto the glued surface and that no air bubbles are allowed to remain under the surface of the print.
6. Allow about 20 minutes for the glue to set, and begin cutting out the print shapes needed for your design using the scroll saw. Take your time, and don't rush the cutting process.
7. After the various shapes have been cut out, paint the edges of the individual shapes with black paint. Allow the paint to dry thoroughly.
8. Assemble and glue each of the pieces together.
9. Mount assembled pictures on mounting base, and display them for other students to view.

Evaluation

Evaluation of your performance on this activity will be based on participation in and completion of the activity.

THERMAL SCREEN PRINTING

Essential Elements: Common: 2, 6, 8, 9
Specific: 6, 7
TAAS Objectives: Language Arts: RC 1-6

Activity Summary
Students complete a photographic screen print using a combination of photography and thermal screen printing materials. Students may create a variety of printed products from greeting cards to T-shirts.

Teaching Tips
1. Read through the entire activity, and become familiar with the project before releasing it to students.
2. Run several test strips of thermal screen through your transparency machine to adjust the temperature setting.
3. Print a few examples of your own to show students some of the possibilities of using this particular process.

Instructional Strategy
- Lecture to present the topic to students.
- Use the demonstration method to help present the topic.
- Encourage student creativity through this activity.

Equipment/Supplies
1. Thermal screen material available through Welch Products, Inc.
2. Transparency imager
3. Darkroom with enlargers, processing trays, and chemicals
4. Kodalith ortho film and two-part developer
5. Contact printer
6. Plastic screen frames
7. Screen printing ink
8. Squeegees

Evaluation Key
Instructor evaluation of student performance should be based on participation in and completion of the activity. The instructor may wish to include additional criteria that meet the particular needs of his or her students.

THERMAL SCREEN PRINTING

Create a photographic screen print by using high-contrast ortho film and thermal screen printing materials.

Objective
- To complete an activity that includes both photography and screen printing

Vocabulary/Concepts Reinforced
- Screen printing
- Photographic process

Equipment/Supplies
- Thermal screen material available through Welch Products, Inc.
- Transparency imager
- Darkroom with enlargers, processing trays, and chemicals
- Kodalith ortho film and two-part developer
- Contact printer
- Plastic screen frames
- Screen printing ink
- Squeegees

Introduction
This activity combines two important communication mediums, photography and screen printing. Each element is a principal element of the communication industry. Photography and the photographic process have remained one of the most powerful and useful communication tools, while screen printing is a basic graphic arts process that is used in a wide variety of applications.

Procedure
1. Begin the activity by reading through the entire set of procedures to ensure that you know what the step-by-step sequence is.
2. Select a photographic negative that you want to use for your screen print design. The photograph should be one in which the image will retain some recognizable detail even when printed onto high-contrast Kodalith (ortho) film.
3. If you are using 35mm Kodalith film, make a contact positive using your original negative and a piece of Kodalith film. Make sure that you place the emulsion sides together under the contact printer. Make a test strip to determine the correct printing time. Process in the two-part Kodalith developer, stop bath, and fixer, and wash properly.
4. When you have completed the contact positive, have your instructor evaluate it for correct processing. Use that positive to make another contact print onto another piece of Kodalith film to produce a negative. The resulting negative should be extremely high contrast with little or no gray tone. Again, process the film using the above steps.
5. After this second generation negative has been processed and dried, it can be placed in an enlarger and printed on an 8x10 piece of photographic paper. This should be processed as a normal print. It will be extremely contrasty. Any retouching or touchup work should be done on the photographic print.

6. Using a copy machine, make a clean copy in order to come up with a carbon-based original to run through the transparency machine.
7. Place the copy under the thermal screen, and run it through the transparency machine. Your instructor will set the temperature control to the correct setting.
8. Carefully peal the screen material away from the copy, and check to make sure that the screen stencil has been formed. Any miscellaneous pinholes and stray marks can be blocked out with rubber cement.
9. Mount the screen onto a plastic frame with masking tape. As you tape the screen to the frame, carefully stretch the screen so that any wrinkles are eliminated.
10. Select your ink color, and carefully squeegee the ink through the stencil onto your printing material. If you are printing on T-shirts, you must prewash the shirts to remove the sizing and then heat-set the textile ink after it has dried.
11. After printing, be sure to thoroughly clean the ink out of the stencil so that it will be ready for another printing session.

Evaluation

Instructor evaluation of your performance should be based on participation in and completion of the activity. The instructor may wish to include additional criteria.

HAND-COLORED, BLACK-AND-WHITE PHOTOGRAPHS

Essential Elements: Common: 2, 6, 8, 9
Specific: 4, 6, 7
TAAS Objectives: Language Arts: RC 1-6; WC 1-7

Activity Summary

This activity is intended to provide students with a short two- to three-day project in which they use a black-and-white negative to produce a hand-colored print. Students will begin with an existing negative, make a black-and-white print, condition the print surface, apply hand coloring, and mount the finished picture. This activity provides an easy-to-use variation to standard photographic processes and is effective in helping students better understand the use of color in communicating through photographs.

Teaching Tips

1. Read through the entire activity, and become familiar with the topic before releasing it to students.
2. Create a bulletin board display illustrating the idea of color as an element in communication.
3. Display student work upon completion of the activity.

Instructional Strategy

- Use the activity as an individual assignment.
- Use the lecture method to present the topic to students.
- Demonstrate the process to students.

Equipment/Supplies

1. Photographic darkroom with enlargers and processing trays
2. Black-and-white print developer, stop bath, and fixer
3. Photographic paper
4. Photographic retouching spray
5. Colored pencils
6. Mounting boards

Evaluation Key

Instructor evaluation of student performance should be based on participation in and completion of the activity.

HAND-COLORED BLACK-AND-WHITE PHOTOGRAPHS

Create colored photographic prints using the hand-coloring technique.

Objectives
- To develop an understanding of color as a basic design element
- To expand on a standard photographic process to create something new and unusual
- To introduce the element of creativity to a standard communication process

Vocabulary/Concepts Reinforced
- Elements of visual design—shape, form, texture, and color
- Tooth—a slightly rough surface texture of a print; in this activity, a lacquer retouching spray is used to provide tooth to the surface of the photograph.

Equipment/Supplies
- Photographic darkroom with enlargers and processing trays
- Black-and-white print developer, stop bath, and fixer
- Photographic paper
- Suitable black-and-white negative
- Photographic retouching spray
- Colored pencils (use a good-quality colored pencil set)
- Mounting boards

Introduction

When discussing the elements of visual design, we often use the basic components of shape, form, texture, and color. Each of these visual elements presents some information about any object. The *shape* of an object presents its two-dimensional quality. The *form* gives us some additional information by illustrating its three-dimensional quality. The surface quality or *texture* gives us even more information about what the object is. And finally *color* provides the lifelike element that gives it realism.

Being able to recognize these elements provides a good exercise in visual awareness and visual design. In this particular activity, you will add the dimension of color to an object within a black-and-white photograph.

Procedure

1. The first step is to select a negative. Although there are not any particular rules for the type of picture that works best, it is best to start with an image that is not too complex. Try to choose one that has a rather simple visual arrangement.
2. In the darkroom, run a series of test strips to determine correct exposure time. For hand coloring, it is best to select a printing time that is just slightly underexposed.
3. Expose and make a print the size that your instructor recommends for your class. Process the print completely in the chemistry that your class uses.
4. After the print has completely dried, use the retouching lacquer spray to provide tooth to the surface of the print. Be careful to use the spray in a well-ventilated space or outside. Apply two very thin coats to ensure proper coverage.

5. After the retouching spray has dried completely, in 5 or 10 minutes, you may begin to pencil in your color. Start by applying the color very lightly and building on it to the color tone that you like. Remember that it is easier to work from light to darker tones than from darker to lighter tones. One variation to the coloring that often creates interesting effects is to color only part of the black-and-white image. This often creates an interesting contrast between the color image and the black-and-white background. Another variation is to use the Letrajet airbrush system to apply the color. It works well with larger print sizes, such as 5x7 and 8x10.
6. After the coloring has been applied, it is advisable to apply another thin coat of retouching spray.
7. Mount finished hand-colored prints for display.
8. Present your finished print to the class for discussion. Discuss how the use of color added a new dimension to the original photograph. Also discuss how color can be used as a powerful element in communicating.
9. Write a one-page technical paper in which you describe the use of color as an added element of visual design.

Evaluation

Instructor evaluation of your performance will be based on participation in and completion of the activity.

COMPUTER MUSIC VIDEO

Essential Elements: Common: 6-10
Specific: 1-4
TAAS Objectives: Language Arts: RC 1-6

Activity Summary

This activity is intended to provide a basic project in which students will use both computer and video images to create a music video. Students will use the Printshop computer program in the Apple IIGS computer which is linked to a video recorder and an audiotape recorder. Students will create a color kaleidoscope to one of their favorite songs and record it for playback to other students.

Teaching Tips

1. Read through the entire activity, and become familiar with the project before releasing it to students.
2. Make an example of your own to help illustrate the topic.
3. Review safety procedures for handling the equipment.

Instructional Strategy

- Use this activity as either a small group or individual project.
- Use the demonstration method to present the topic to students.
- Use the principles of teamwork to facilitate the project.

Equipment/Supplies

1. Color computer such as the Apple IIGS
2. Graphics program—Printshop or Paintworks
3. VCR and monitor
4. Audiocassette player and music tape
5. Blank videotapes
6. Connecting cables

Evaluation Key

Instructor evaluation of student performance should be based on participation in and completion of the project.

COMPUTER MUSIC VIDEO

Create a music video by using a color computer program to generate the graphics that are matched to the music.

Objectives
- To provide an activity that uses three various electronic media components
- To provide an activity in which students must use an electronic communication medium

Equipment/Supplies
- Color computer such as the Apple IIGS
- Graphics program such as Printshop or Paintworks
- VCR and monitor
- Audiocassette player and music tape
- Blank videotapes for recording
- Connecting cables

Introduction

The use of electronic communication media has evolved into one of the most advanced technical systems in use by industry and individual consumers. Small compact video recording systems have revolutionized the home video market and have even helped to fuel at least a few actual revolutions around the world. The home video recorder/player has created an entire industry through the use of movie rentals. The development of sophisticated high resolution computer graphics has also begun to evolve into an industry of its own. Recent developments in the use of color graphics, three-dimensional imaging, and audio capabilities have become almost standard operations in business offices, printshops, architectural and engineering firms, and even Hollywood.

In this activity, students will create a short music video using computer-generated video images to go along with one of their favorite songs. Students will incorporate three primary pieces of electronic media equipment—the computer, the video recorder, and an audiotape player.

Procedure

1. Begin this activity by making sure you have all the necessary equipment. It is important that you have the necessary connecting cables to tie the various pieces of equipment together.
2. With your instructor's assistance, make the necessary connections to patch the computer monitor into the video recorder. Boot up your computer program, and check to see that the computer image is also being dispalyed on the video monitor.
3. Next, patch the audiocassette recorder into the audio input on the video recorder. Check the audio input by turning up the volumn on the video monitor.
4. With all connections complete, run a short test to ensure that both the computer image and the audio are being recorded on the videotape.
5. One very simple program that can be used to generate some interesting visual effects is The Printshop. One of the features of this computer graphics program

is the kaleidoscope function. The kaleidoscope will create an interesting, everchanging, full-screen color image. You might also use its text-generating features to make titles for your music video.

6. Once you are comfortable with the computer program and have your music selected, it is time to create your own music video. It may take a couple of tries to get the timing down right, but the results are often very interesting.
7. When you have finished your production, you should show it to the class along with other student videos for discussion.

Evaluation

Instructor evaluation of your performance should be based on participation in and completion of the project.

PHOTOGRAPHIC SCREEN PRINTING

Essential Elements: Common: 6-10
Specific: 1, 3, 4
TEAMS Objectives: Language Arts: RC 1-6

Activity Summary

This activity uses photographic materials and equipment in the production of a product. It can be either a group or an individual project.

Teaching Tips

1. Read through the entire process before presenting it to students. You may want to try out the activity in advance to generate several examples of the process to show students.
2. Use the demonstration method to present the activity to students. It is a fascinating process for students to try, and they will become thoroughly motivated with a well-planned demonstration.
3. After the process has been demonstrated, give students some options for their products (T-shirts, bumper stickers, posters, greeting cards, etc.). They should, however, be limited to a product within their ability. Making multicolored prints can be a difficult task even for experienced printers.
4. Stress the importance of neatness and craftsmanship. They are vital to the successful outcome of the products.

Instructional Strategy

- Provide opportunities for transfer of learning.
- Relate content to prior or future learning.

Equipment/Supplies

1. Silk-screen frames
2. Silk-screen fabric
3. Squeegees
4. Photographic stencil material (Ulano Blue Poly Z works well)
5. Processing chemical (Ulano Part A and B Developers)
6. Two sheets of glass (large enough to cover the stencil area)
7. Tracing paper
8. Drawing pens (use opaque inks only)
9. Photo floodlamp with reflector
10. Screen printing inks (use oil-based inks)

Evaluation Key

Students will submit completed silk-screen prints.

PHOTOGRAPHIC SCREEN PRINTING

Learn how to make photographic silk-screen prints.

Objectives
- To describe the basic photographic process
- To describe the basic silk-screen printing process
- To develop a product using basic photographic equipment and processes

Vocabulary/Concepts Reinforced
- Photographic emulsion—the surface layer of photographic film containing the light-sensitive material which, when processed, will establish the recorded image.
- Negative image—when a photograph is taken of an object, the film records a negative image.
- Positive image—when the negative image is printed onto another light-sensitive material such as photographic paper, the resulting image is positive. The positive image is how the viewer sees the actual object.
- Silk-screen printing—a form of stencil printing using a design cut out of paper, or other material such as photographic stencil, attached to a sheet of silk that has been tightly stretched across a frame. Ink is then forced through the open meshes of the silk using a rubber blade called a squeegee.

Equipment/Supplies
- Silk-screen frames
- Silk-screen fabric
- Squeegees
- Photographic stencil material (Ulano Blue Poly Z works well)
- Processing chemical (Ulano Part A and B Developers)
- Two sheets of glass (large enough to cover the stencil area)
- Tracing paper
- Drawing pens (use opaque inks only)
- Photo floodlamp with reflector
- Screen printing inks (use oil-based inks)

Introduction

The silk-screen printing process is versatile. It is practical for short runs because of the low cost in the preparation for printing. It is also practical for long runs using automatic equipment. Not only is it well suited to short and long runs, but it is also possible to print on any surface, such as wood, metal, fabrics, and plastics, as well as on many kinds of paper. Since a heavy deposit of ink is possible, it is especially well adapted to printing reflective signs and displays.

Silk is the most popular fabric. However, cotton organdy, nylon, and fine wire mesh screens are good for special uses. The size of the openings in the mesh might vary from 6xx (coarse) to 18xx (very fine) in silk. Medium or 10xx is recommended for average work. Coarse mesh is used for big, heavy designs and the finer meshes for smaller, detailed work. Fine mesh is recommended for printing photographic stencils.

The simplest stencil would be a silhouette design cut in a piece of paper. However, hand-cut film stencils are more practical when there are loose centers in the design. Tusche and crayon stencils are preferred for scenics and poster reproduction.

The general procedure is similar for all types of stencils. First, the design must be made; second, the printing unit is prepared for printing; third, the stencil is prepared and fastened to the silk; fourth is the printing operation; and fifth, the printing unit is cleaned.

Procedure

1. *Prepare the design.*
   The design to be printed is prepared in full size and should not be too detailed for your original print. Multicolored designs require careful registration and should be attempted only after printing several simple stencils.

   The original is either made on the size of paper to be printed on or mounted on paper cut to the size that will be printed.

2. *Prepare the screen.*
   The screen frame should be constructed form 2" x 2" stock. Use the table saw to cut one saw kerf about 1 1/2 inches deep on the bottom edge of the stock. The actual frame size depends on the size of the prints that you will make. Start with frames that are about 11" x 14". Use a miter joint at the corners. The frame should be constructed so that it is sturdy and sits flat.

   The silk may be secured to the frame by using window screen spline, which is forced into the groove on top of the screen. By using a window screen spline roller, you can stretch the screen tightly across the frame. This method also allows you to replace the screen or restretch it easily. Cut the silk about one inch larger than the frame size.

   Stretch the silk so that it is tight and wrinkle-free. A tightening fluid, called Silk Tite, or airplane "dope" can be applied on the cord and silk extending over the inside edge of the frame about 1/2 inch.

   After the Silk Tite is thoroughly dry, wash the silk with clean warm water. This removes the starch from the cloth.

   Construct a printing base from an old drawing board, a piece of tempered hardboard, or a piece of plywood that is the same size as the screen frame. This should be covered with wrapping paper to form a smooth, flat, clean printing surface.

3. *Prepare the stencil.*
   The widespread use of the silk-screen process can be attributed in large measure to the development and perfection of the photographic method in making silk-screen stencils. This, like all photography, is based upon the principle that substances such as gelatin or albumen will become light-sensitive when mixed with salts such as sodium, potassium, or ammonium dichromate. When a substance has been made light-sensitive, it will harden when exposed to light. Areas protected from light remain soft.

   Two types of photographic stencils are used: the direct type and the transfer type. With the direct type, the silk or other fabric is sensitized with an

emulsion directly on the screen. The transfer type of photographic stencil is first processed and then transferred to the screen.

Since less elaborate equipment is required to make photographic transfer stencils, this process is recommended for small operations. There are several types of photographic stencil materials on the market. However, the same principles apply for all photographic transfer stencils. Here is how the process works.

A transparent positive of the design is the first requirement. A transparent positive is an opaque design on a transparent sheet. Positives can be made by photographing the design with Kodak high-speed duplicating film. Positives can also be made by drawing the design on a matte finish acetate or a good grade of tracing paper commonly used by drafters.

Transparent positives can also be made by pasting Artype letters on the transparent medium. The Artype letters are printed with black ink on a thin plastic material which has a sticky back. Rub-on transfer letters also work well for this process. Many different designs and patterns are available. These are easy to work with and can be found at most office or drafting supply businesses.

When the positive has been prepared, mount the original design on paper that is the size of the paper or other material to be printed. This is used to locate register guides. Guides may be made of index bristol and taped to the base of the frame. Whenever possible, you should use two register guides on the long edge of the sheet and one register guide on the short edge that faces toward the hinges of the printing frame.

Ulano Blue Poly Z is typical of presensitized photo films. Therefore, it is used in this description of how to make a photographic stencil.

Mix the developer. Dissolve one packet of A developer in 32 ounces of water. When this is completely dissolved and mixed, add to this one packet of B developer and mix thoroughly. Store in a brown bottle. The mixed developer will be enough for several stencils and can be stored for two or three days.

Cut a piece of presensitized photo film about 2 inches larger than the design on all four edges.

Place a clean piece of chipboard, larger than the stencil to be made, on the mat of the work table. Place the photo on the chipboard with the shiny side up. The reverse side of the photo film is coated with a light-sensitive emulsion and can be scratched easily.

The transparent positive original is then centered over the photo film so it is "wrong reading"; in other words, words and designs will appear backwards.

It is recommended that a "safe edge" be placed around the transparent positive. This can be any opaque paper such as black paper found in film boxes. This provides a sharp, distinct edge, which is desirable when developing the photo stencil.

5. *Expose the photo film.*
Place a sheet of clean glass over the original, and make sure that there is good contact between the original and the photo film.

Exposing the film is done by controlling the amount of light that will hit the sensitized emulsion. The thickness of the stencil is affected by exposure time. A short exposure results in a thin stencil; a longer exposure time produces a thick stencil. Where light strikes the light-sensitive emulsion on the photo film, the gelatinous material hardens. Where the light is blocked out, the gelatinous material remains soft.

Your exposure can be made in direct sunlight (about 5 minutes) or by using a single photo floodlamp with a reflector (about 15 minutes). Make several exposure tests to find the best combination for your printing purposes.

6. *Develop the photo film.*
Pour previously mixed developer into a tray. Use enough developer to cover the photo stencil completely. Place the exposed film in the developer for about 1 1/2 minutes with the plastic side of the film against the bottom of the tray.

7. *Wash out the stencil.*
Place the developed film in a clean tray of warm water. Rock the tray so the warm water passes over the stencil, or spray the stencil with a gentle stream of warm water. This washes out the image in the stencil. It is important that the image area be completely clear.

When the design is clear, immerse the stencil in a tray of cool water (65° to 70°F) for about 2 minutes or until it is ready to adhere to the screen.

8. *Adhere stencil to screen.*
Place the stencil in register with the design on the base of the printing frame. Lower the screen frame onto the stencil. Place a piece of blotting paper over the stencil and gently rub the surface of the paper. This forces the soft gelatinous material into the meshes of the silk. Do not rub the surface of the screen with the paper because you may fill in the image area with stencil material from the nonimage area.

It will take about 30 minutes for the pigment to dry in the meshes of the screen. This can be hastened by the application of heat. When the pigment and screen are thoroughly dry, the plastic support will fall off, or it may be peeled off, leaving the pigment in the screen. The remaining open areas in the screen may be masked or blocked out, and the screen is ready for printing.

To remove photographic stencils from a screen, detach the base from the frame. Soak the stencil in warm water for about 3 minutes; then brush the stencil, flushing away the pigment with warm water.

9. *Make the screen print.*
The kind of ink to be used is detemined by the kind of material to be printed. Silk-screen supply houses stock special inks for a wide variety of printing surfaces. In most school operations, the ink stock should consist of an assortment of both oil-based textile and regular oil-based printing ink.

In most cases the stencil does no cover all of the open areas of the screen. A paper mask, folded to fit the inside of the frame, is commonly used to cover these open areas.

Holding the screen and a mask up to a light source, mark the mask where it must be cut out to permit printing the design.

Ordinary gummed paper tape is commonly used to seal the mask to the silk. Masking should be at least 1 inch away from the design on all edges. If masking is placed closer to the design, the squeegee does not make good contact with the silk, resulting in a fuzzy print.

Use a spatula to place a quantity of ink in the screen frame at the top of the stencil. Sufficient ink should be used so that it will roll in front of the squeegee, covering the design in one stroke.

Hold the squeegee at a slight angle so that only the sharper edge of the rubber blade contacts the silk. With firm downward pressure, pull the squeegee across the open areas in the screen. To get the best results, try to use only one stroke per print. This requires a squeegee that is at least as wide as the print.

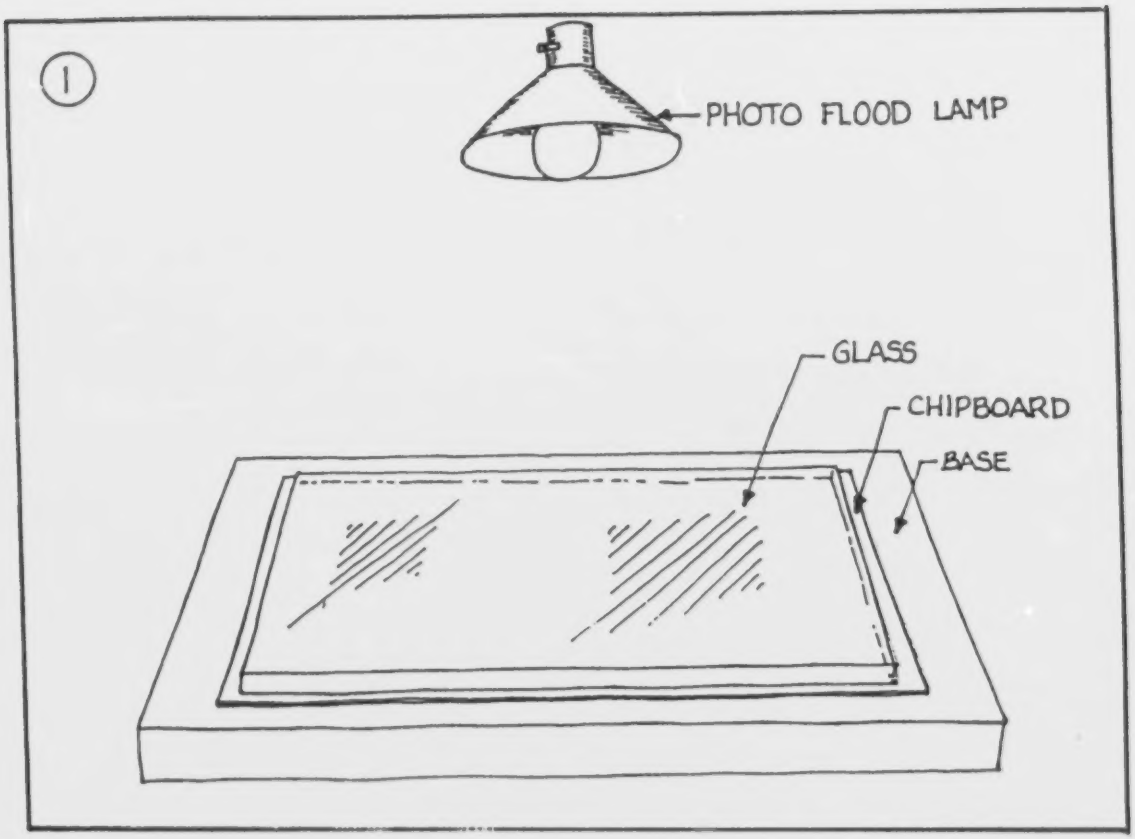
Raise the screen frame, remove the printed copy, and insert another sheet aligned with the register guides. Prints should be left to dry on a clean surface for about 30 minutes. Printed T-shirts should be allowed to dry overnight.

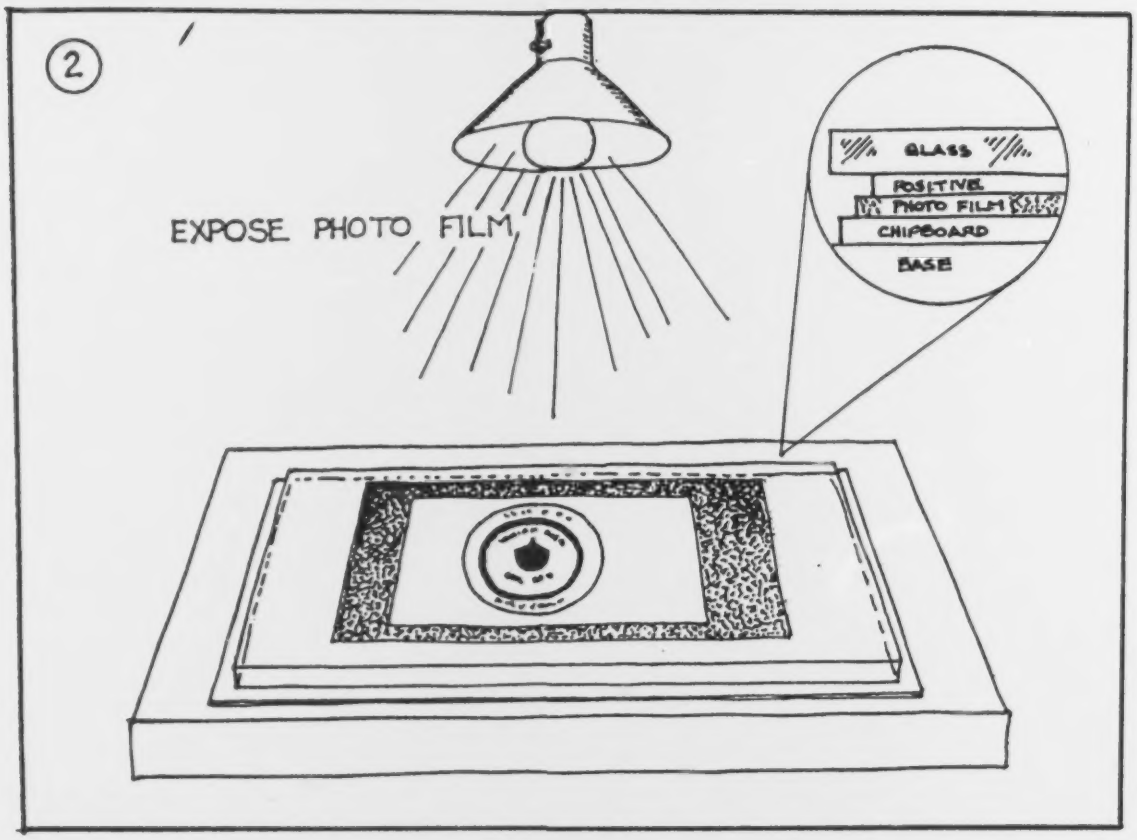
10. *Clean the screen.*
When the printing operation is finished, it is important to clean the screen thoroughly before the ink dries in the screen.

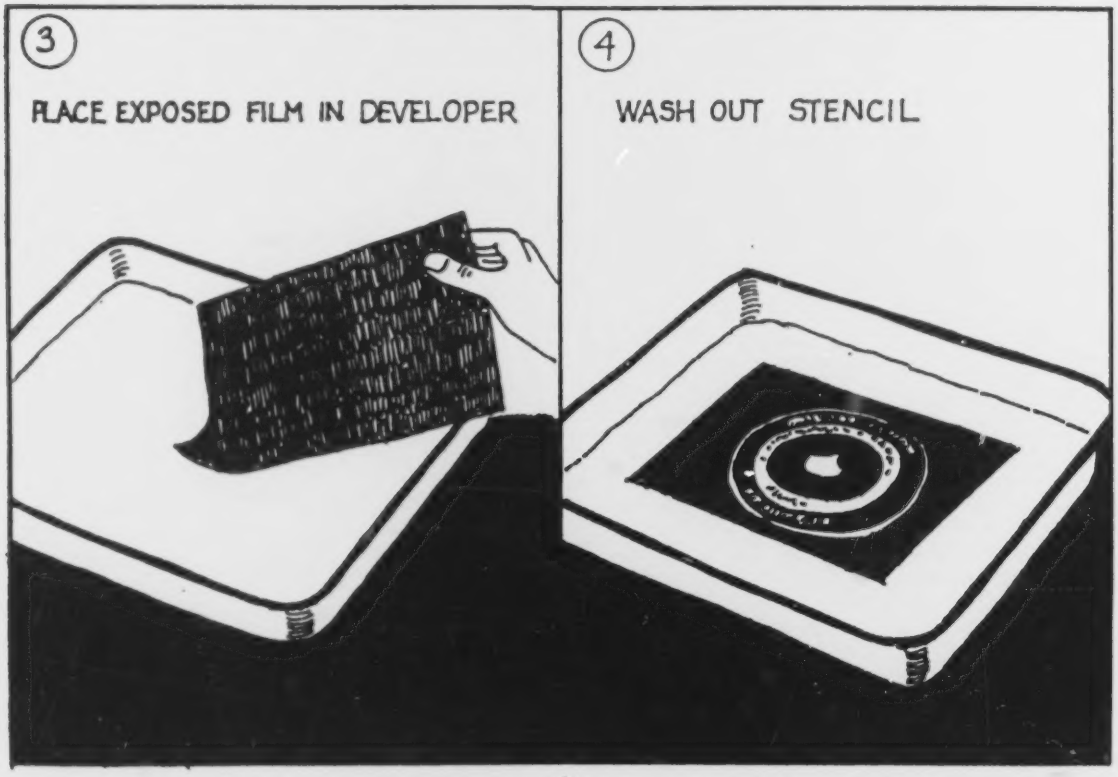
Use a piece of scrap cardboard to scrape up any ink remaining on the screen. Use a knife to push this ink back into the ink container. Be sure to seal the ink container before leaving the class.

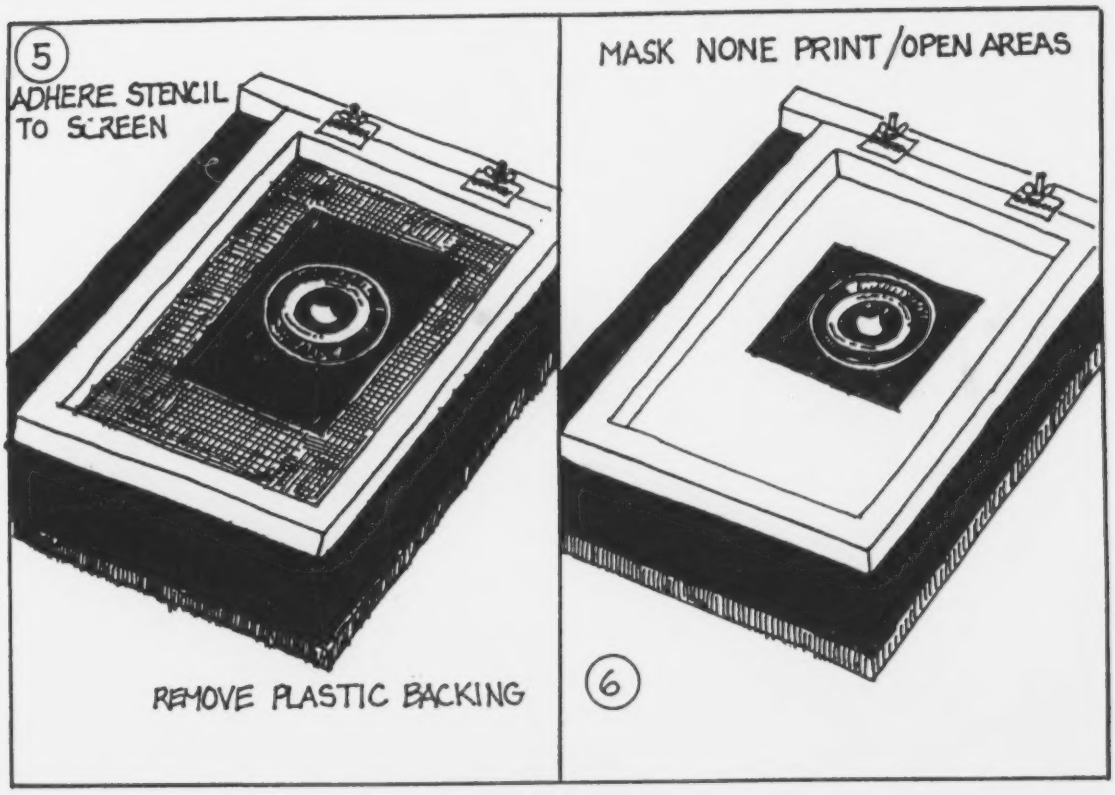
After the excess ink has been removed from the screen, you can clean out the remaining ink with solvent. Place the screen to be cleaned on several layers of newspapers. Saturate a rag with solvent, and clean both sides of the screen. Repeat this process until all the ink has been cleaned out. Remember, a clean screen can be used over and over again.

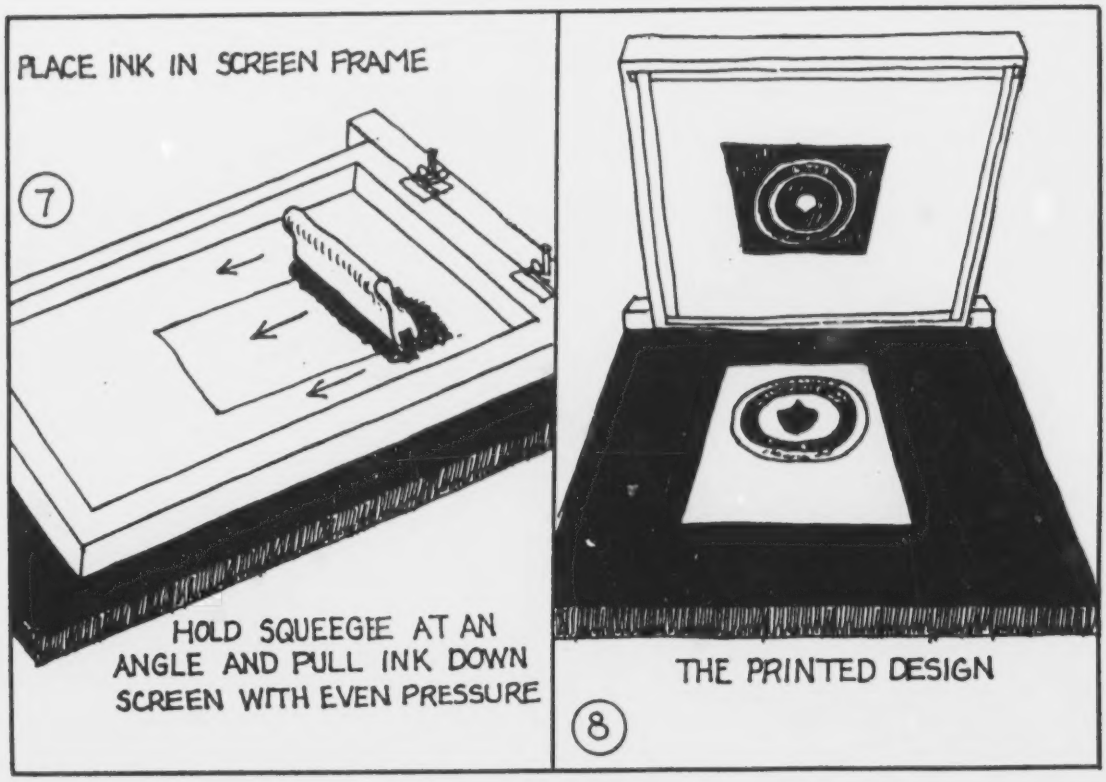
Evaluation
Submit your completed prints to your instructor.


1
PHOTO FLOOD LAMP
GLASS
CHIPBOARD
BASE


2
EXPOSE PHOTO FILM
GLASS
POSITIVE
PHOTO FILM
CHIPBOARD
BASE


3
PLACE EXPOSED FILM IN DEVELOPER
4
WASH OUT STENCIL


5
ADHERE STENCIL TO SCREEN
REMOVE PLASTIC BACKING
MASK NONE PRINT/OPEN AREAS
6


PLACE INK IN SCREEN FRAME
7
HOLD SQUEEGEE AT AN ANGLE AND PULL INK DOWN SCREEN WITH EVEN PRESSURE
THE PRINTED DESIGN
8

DESKTOP PUBLISHING

Essential Elements: Common: 7-10
Specific: 1
TAAS Objectives: Language Arts: RC 1-6; WC 1-7

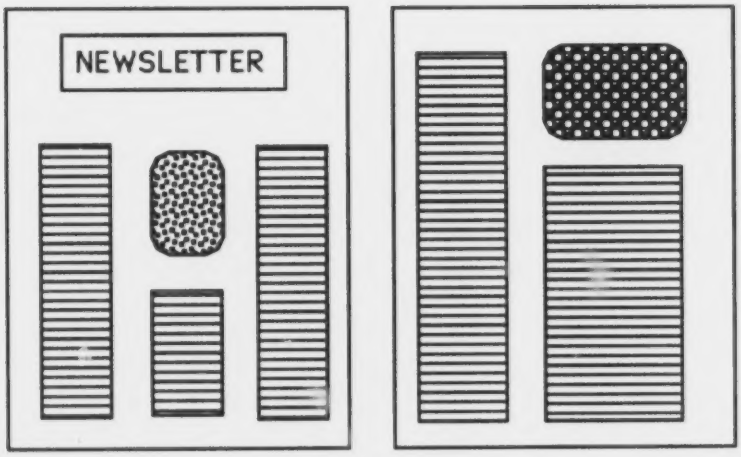
Activity Summary
This activity will allow the students to use the computer to produce a newsletter.

Teaching Tips
1. Allow the students to be creative. Be involved enough to not let the topics become too controversial. Also make sure that all articles are in good taste and not likely to affront anyone.
2. You might work with the English or Language Arts teacher on this assignment. You also might work with the school newspaper faculty advisor to publish the school newspaper.
3. This module could be approached as a community service activity. A newsletter for parents or a service organization might be worthwhile. You might consider inviting your local newspaper editor to give a talk about publishing.

Instructional Strategy
- Introduce the activity, and demonstrate word-processing and painting or drawing software programs. Select the editor and assistant editor (Day 1).
- Identify the theme of the newsletter and what articles should go in the newsletter; assign articles to student reporters (Day 2).
- Have students write articles, word-process them, and create graphics (Days 3-7).
- Reproduce the newsletter (Day 8).
- Distribute the newsletter (Day 9).

Equipment/Supplies
1. Computer
2. Word-processing software
3. Painting or drawing software
4. Photocopier or offset press
5. Paper

Evaluation Key
1. Define the following terms:
   Word-processing program: A word processing program, which is a writing tool, allows you to create different types of documents, correct errors in those documents, store the documents on a disk, and produce printed copies of those documents.
   Xerography: Xerography uses a special photoconductive plate to transfer images.
   Computer literacy: The level of skill that enables a person to transfer the concepts of computer use from one brand to another, or to use several types of computer programs.
   Pasteup: The pasteup is the final, camera-ready copy of the newsletter.
   Layout: A layout is the completed design of actual size.
   Computer graphics: Computer programs that allow the user to manipulate the computer to produce graphic images.
2. Use your design and layout skills to arrange the following parts of a two-page newsletter:



Support Materials
Computers in Your Life. 13 min. film. Available from Modern Talking Picture Service, 5000 Park Street North, St. Petersburg, FL 33709-9989. Free.

DESKTOP PUBLISHING

Use the computer to produce a newsletter.

Objectives
- To correctly use the word-processing program on the computer
- To correctly use the "paint" or draw program on the computer
- To research and write an article for the paper
- To paste up a layout for reproduction
- To reproduce the newsletter and distribute copies

Vocabulary/Concepts Reinforced
- Oral and written communication
- Word-processing program
- Xerography
- Computer literacy
- Pasteup
- Layout
- Computer graphics

Equipment/Supplies
- Computer
- Word-processing software
- Painting or drawing software
- Photocopier or offset press
- Paper

Introduction

Desktop publishing is a new term reflecting the ability to put information for publication together on a small space; hence, "desktop." The tool that facilitates this amazing process is the computer. The copy to be printed can be done on a computer, as well as the pictures or graphics that accompany the articles.

A computer is an electronic information-processing piece of equipment. The computer follows instructions given to it by humans via the keyboard or a computer program. This lesson will use two types of computer programs: a word-processing program and a graphics program. A word-processing program is one that is a writing tool; it allows you to create different types of documents, correct errors in those documents, store the documents on a disk, and produce printed copies of those documents. Depending on the complexity of the word-processing program, many other functions can be carried out, such as correcting spelling errors, moving portions of text from one place to another, and merging information from several documents to create a new document.

Computer graphics programs allow the user to manipulate the computer to produce graphic images. These images can be in the form of art, maps, illustrations, or drafting assignments. Usually, some type of external attachment such as a graphics tablet, joystick, or mouse is used to create the graphic. Once a person has developed the level of skill to transfer concepts of computer use from one brand to

another, or use several types of computer programs, that person would be considered computer literate.

You will need to determine the focus of the newsletter. It could be one of the following:

1. Newsletter for a local nursing home
2. Newsletter for the industrial technology program for an open house or regional industrial technology fair
3. Newsletter for the school, focusing on a theme (e.g., technology and school work, food and arts guide to the local hangouts)—be sure not to compete with the school newspaper. If there is not a current school newspaper, start one with this activity.
4. Current issue confronting the students and/or the community

Each class will choose an editor and assistant editor. Once the topic is decided upon, the editor will work with those students who will be writing articles. Other students will design artwork or take pictures to go in the newsletter.

Two students should work on the layout design of the newsletter. Factors to consider include these: What size sheets of paper should be used? Should the newsletter be folded (8 1/2 x 11" sheets folded into 5 1/2" x 8 1/2" sheets)? Should we print on one side of the page or two? Where should pictures and cartoons go? How many columns across the page should there be?

As the articles start to be completed, they should be typeset on the word processor by the author(s). After a copy is printed, it should be proofed and corrections made. After a final copy is printed, it should be pasted into place for the newsletter. A layout is the completed design of actual size. This provides a guideline for the final design and a time to look for any areas that need to be altered. The pasteup is the final, camera-ready copy of the newsletter. Using the layout as a guide, all final copies of articles, artwork, and masthead are put in place.

Production time has arrived. Xerography is a popular form of reproduction of originals. It is similar to photography, but does not require sensitized paper or plates. Xerography uses a special photoconductive plate to transfer images. Copies of the newsletter that have been printed need to be collated and stapled. Each student should receive several copies to distribute to the targeted audience.

Procedure

1. Observe and take notes on the demonstration on word processing.
2. Hand-draw pictures if your computer does not have a graphics program.
3. Choose an editor and assistant editor. Take assignments and conduct research.
4. Complete articles; use the word processor on articles; work with the editor to make corrections.
5. Paste up articles into final copy.
6. Reproduce copies of newsletter.
7. Assemble newsletter and distribute.

Evaluation

1. Define the following terms:

Word-processing program: _____

_____

Xerography:_____

_____

_____

_____

Computer literacy: _____

_____

_____

_____

Pasteup: _____

_____

_____

Layout:_____

_____

_____

_____

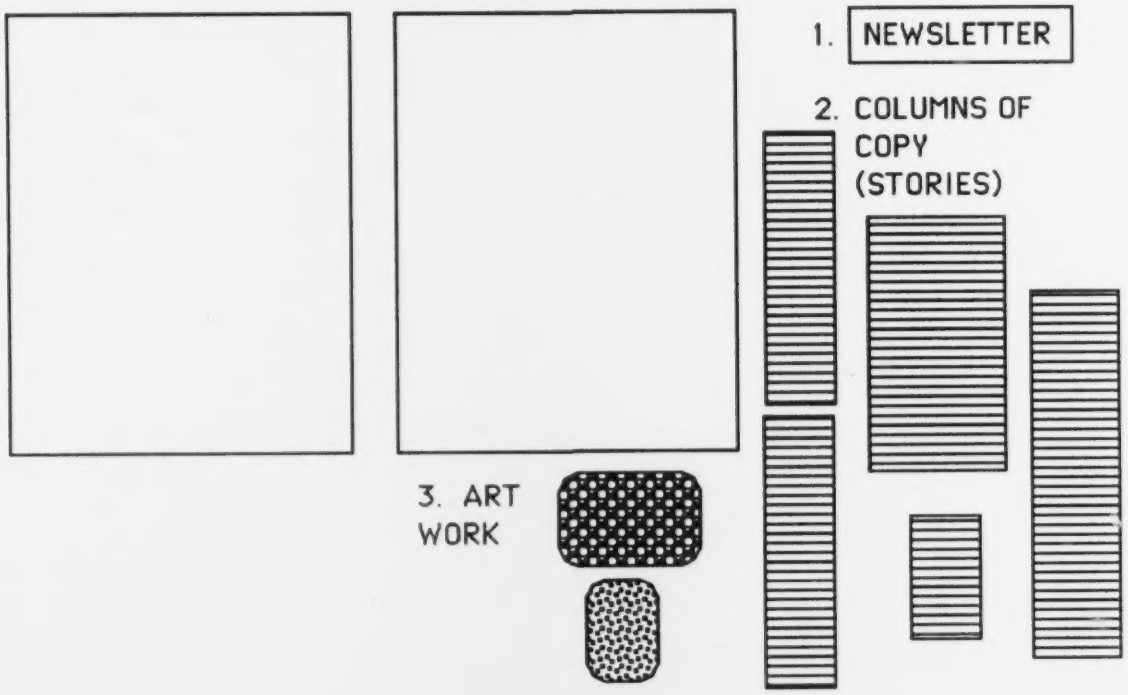
Computer graphics: _____

_____

_____

_____

2. Use your design and layout skills to arrange the following parts of a two-page newsletter. Remember the elements of design when considering where to place each piece of copy and artwork. Sketch on the blank newsletter pages, or draw arrows from the three parts (masthead, copy, and artwork) to indicate where they should be placed.


1. NEWSLETTER
2. COLUMNS OF COPY (STORIES)
3. ART WORK

DESIGN AND DRAFTING

Essential Elements: Common: 6-10
Specific: 1, 3
TAAS Objectives: Language Arts: RC 1-3; WC 1-4
Mathematics: PS 1-4

Activity Summary

This module will introduce design concepts and introductory drafting skills to the students. They will be provided with a design problem to solve. This unit can be used in conjunction with one or more of the following modules: Logo Design, Future Space Communication, any of the production activities, and any of the integrated activities. One other way to use this module is in conjunction with the Dream House for the Elderly module in *Technology Systems* (EIMC, 1988). Students could design the dream house in detail on paper first, and then build a scale model.

Teaching Tips

1. Read through the activity with the students.
2. Discuss the procedure, and make sure that students understand their assignments.

Instructional Strategy

- Relate content to prior or future learning.
- Provide opportunities for transfer of learning.

Equipment/Supplies

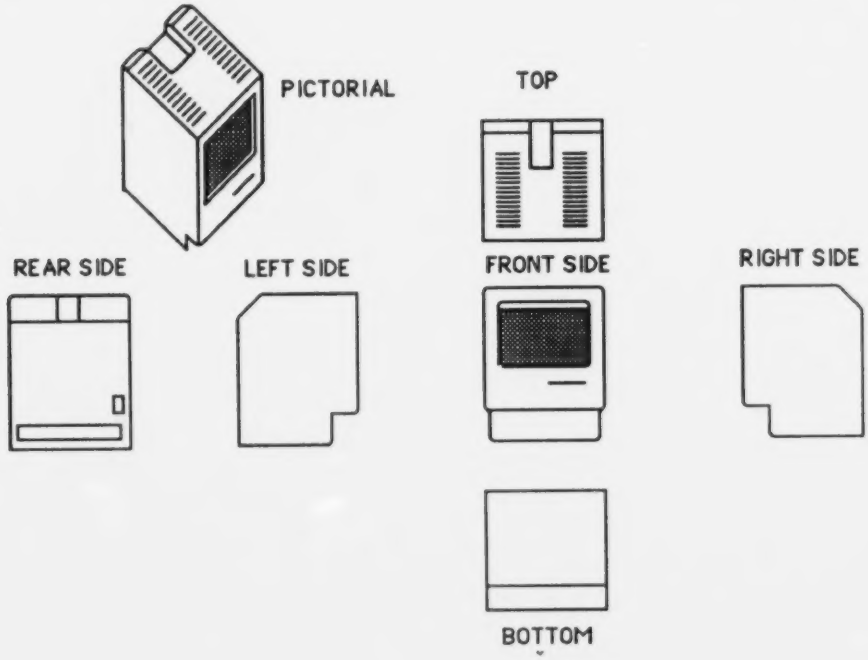
1. Tape
2. Scales
3. T-squares
4. Triangles
5. Objects for the students to sketch
6. Computer
7. Printer/plotter
8. CAD software
9. Other basic drafting supplies as needed

Evaluation Key

1. Define *design: Design* is "the creative process of finding solutions to problems" (Jones & Robb, 1986). Design involves the use of problem-solving techniques.
2. List the principles of design:
   a. Balance
   b. Proportion
   c. Contrast
   d. Unity
   e. Compatibility
3. List the steps in problem solving:
   a. Observe a given situation.
   b. Define the problem as observed.
   c. Create alternative solutions, and choose the best ones to test as hypotheses.

d. Collect data and analyze results.
e. Select the most appropriate course of action.

4. Apply the principles of design, and use the steps in problem solving to design a solution to the problem listed:
Draw six views of the object the teacher has placed on the desk.



Support Materials
Jones, R. E., and Robb, J. L. *Discovering Technology: Communication.* Orlando: Harcourt Brace Jovanovich, 1986.

DESIGN AND DRAFTING

Study design concepts and introductory drafting skills.

Objectives

- To define design
- To list the principles of design (see Activity 28)
- To list the steps in problem solving
- To apply the principles of design and use the steps in problem solving to design a solution to the problem
- To use basic drafting and sketching techniques to solve problems

Vocabulary/Concepts Reinforced

- Design
- CAD/CADD
- Triangles
- Oblique drawing
- Pictorial
- Scale
- Orthographic projection
- Written communication
- Freehand sketch
- T square
- Isometric drawing
- Measurement

Equipment/Supplies

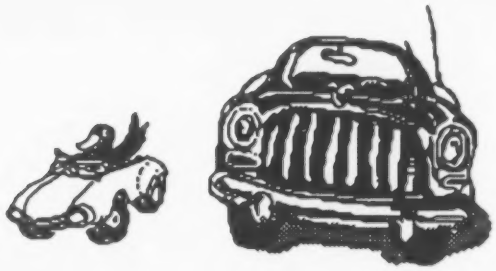
- Tape
- Scales
- T-squares
- Triangles
- Objects to sketch
- Computer
- Printer/plotter
- CAD software
- Other basic drafting supplies as needed

Introduction

Design is "the creative process of finding solutions to problems" (Jones & Robb, 1985). Design involves the use of the steps in problem solving:

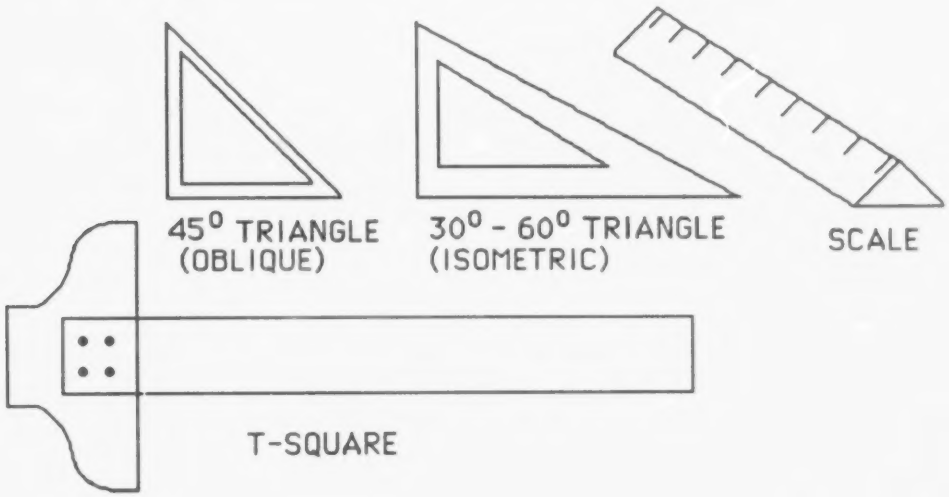
1. *Observe the situation.* What new object or changed object is needed to improve the situation?
2. *Define the problem.* Do you get too hot riding your bicycle? Design a holder for your bicycle that is made of a lightweight material and will hold one 16-ounce drink container.
3. *Create alternative solutions.* What type of materials could be used? Styrofoam, metal, plastic, string, wire, elastic, fabric, or a combination of these? What size should it be? Diameter? Height? Don't consider any alternative as too foolish at this point.
4. *Collect data.* What different combinations of size and material might work? Narrow your alternatives and test the best two or three. Ask yourself if your alternatives solve the problem stated earlier. Is the alternative a workable one? Can you get the materials needed to complete the task? Is it easy to use? Does it have appealing design?
5. *Select the best choice.* Which alternative is the best solution to the stated problem? Select that alternative as your solution.

Freehand sketches are drawings made without using any special drafting equipment. Almost everyone uses these at one time or another to convey an idea to someone else, or just to sketch for fun. If you have had an art class, you may have done some sketching. Pictorial drawings are a combination of formal drafting techniques and freehand sketches. They represent a picturelike example of a product.

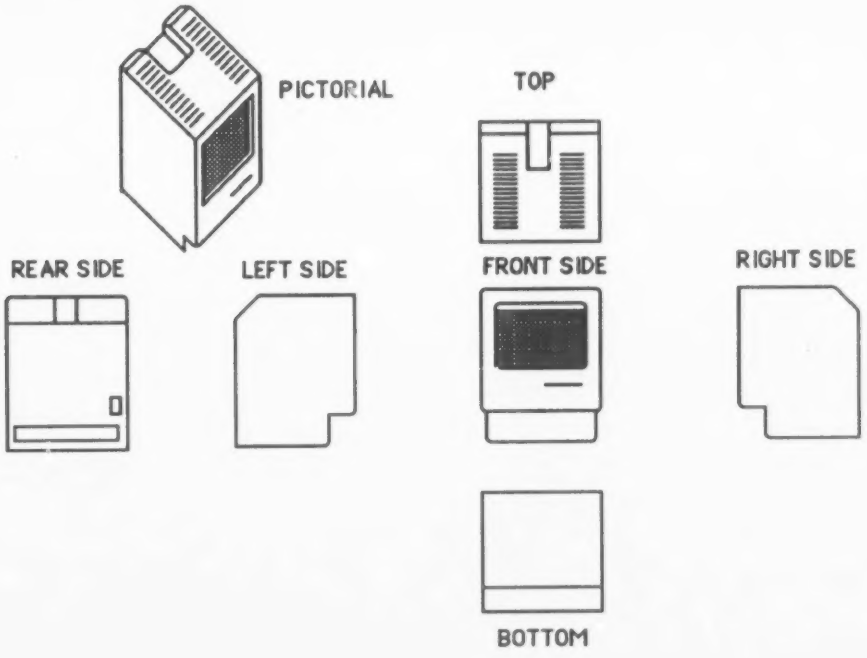


CAD stands for *computer-aided design*; CADD stands for *computer-aided design and drafting*. CAD is the process of using a computer to do the design work. It is much faster to use computers to create designs and do the necessary drafting work related to product design. Changing a design is also much easier on a computer. A computer can allow the designer/drafter to consider several alternatives before completing the design and printing a copy.

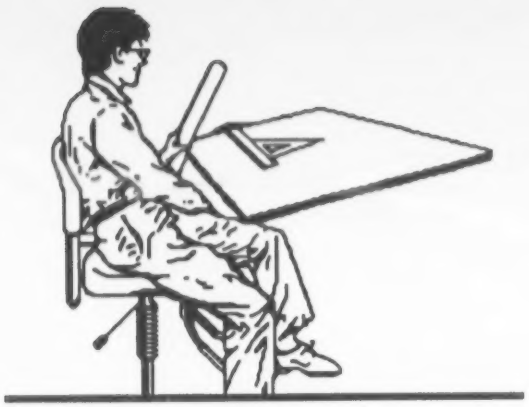
Drafting is the use of special equipment to produce drawings that can be used to make a product, build a house, use an accurate map, or show pathways for electricity. Basic drafting equipment includes T squares, triangles, and scales. The illustration below provides an idea of what each piece of equipment looks like.



Orthographic projection is used to present three views of an object to understand what the object looks like. An orthographic projection uses the top, front, and side views of an object; the left side, rear, and bottom sides are not shown. The top, front, and side views show enough of the object to indicate the dimensions necessary to make the object.



The drawings indicate the different views of an object. It is important for you to understand the different views and how to determine what each view should look like. Borderlines are used to frame a drawing, and the title box provides the necessary information about the drawing.



TITLE BOX 1/2" SCALE FOR 8X11"

NAME, COURSE	TITLE	DATE	SCALE	DRAWING #	GRADE
3"	3"	1-1/4	1-1/4	1"	3/4

In reviewing this communication system, we should identify the inputs, processes, outputs, and feedback parts of the system. The inputs to drafting include an object to be defined on paper, the drafting equipment, and the drafter. The process is representing the object on paper by actually completing an orthographic projection or some other type of drawing. The output is the drawing. Feedback occurs when the drawing is evaluated to see if it accurately represents the object.

Procedure

1. Do a freehand sketch of the object provided by your instructor. Complete an isometric, an oblique, and a three-view drawing of the same object.
2. If you have a computer, complete a drawing of the object on the computer.
3. Design and draw plans for a device that will alter one of the pieces of equipment in the lab for use by a handicapped student (e.g., a student in a wheelchair, a student with only one operable arm, etc.).

Evaluation

1. Define *design*: _____

_____

_____

2. List the principles of design:

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

3. List the steps in problem solving:

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

4. Apply the principles of design and use the steps in problem solving to design a solution to the problem listed:

   Draw six views of the object the teacher has placed on the desk.

TELECOMMUNICATION

Essential Elements: Common: 6-10
Specific: 1, 2
TAAS Objectives: Language Arts: RC 1-6

Activity Summary
This activity will introduce the topic of telecommunication. The students will work in groups to develop television commercials to promote a product or school activity. Students will fill various roles to complete the assignment: director, actor/actress, camera operator, technician, and cue card person. Alternate activities are suggested for schools without video equipment.

Teaching Tips
1. This assignment can be used as is or adapted in several ways. First, if time permits, allow the students to rotate through the different jobs so that everyone has a chance to be the star, director, etc.
2. If video equipment is not available, change this to a radio assignment, and use a tape recorder to tape radio commercials.
3. Another twist would be to integrate this module with the mass-production manufacturing assignment and have the students sell the product made by the class.
4. The best commercial representing the product would receive a special prize in addition to a grade.

Instructional Strategy
- Begin the module by providing new information to the students and leading a discussion of the social issues involved.
- Introduce the activity by explaining what is expected of the students, and set the limitations you desire (e.g., length of commercial, topics that are acceptable, etc.)
- Provide the students the necessary work time. Four or five class days should see them through most of the work.
- As soon as one group is ready to film, let them get started so that all groups of students are not waiting for the camera at once.
- Another way to schedule camera time for final commercial filming would be to have students come before or after school to ensure a "quiet studio" and no pirating of ideas by other groups.

Equipment/Supplies*
1. Video camera
2. Video recording unit
3. Videotapes
4. Lights
5. Backdrop
6. Props
7. Newsprint
8. Masking tape
9. Costumes
10. Television monitor

* See Teaching Tips for exceptions.

Evaluation Key
Students should receive a daily grade for their input into the progress of the group. Group grades will be given for the script and the final product. Another possible assessment tool would be to have other students rate their peers, or use a local grade school or middle school for a test audience.

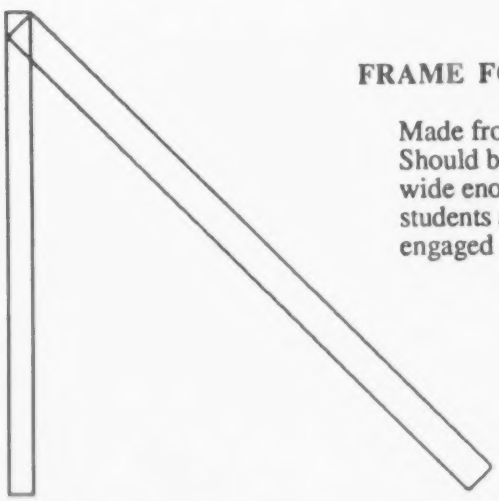
Answers to Quiz

1. List three types of telecommunication.
   a. Voice
   b. Data
   c. Image

2. List three social and/or environmental concerns about telecommunication.
   a. Overcrowding in outer space
   b. Instant news coverage of tragedy
   c. TV violence causing real violence
   (Accept any others discussed in class.)

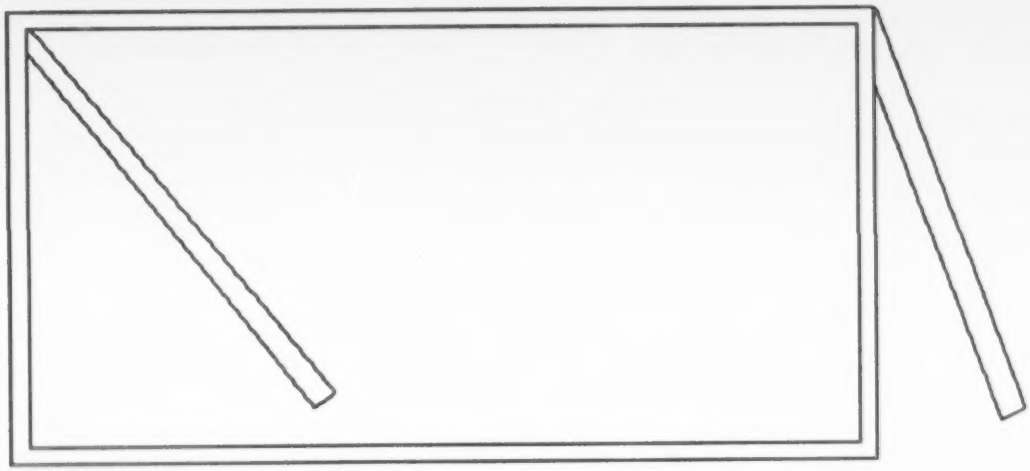
3. List five careers that could be pursued in telecommunication.
   a. Director
   b. Actor/Actress
   c. Camera Operator
   d. Technician
   e. News Correspondent
   (Accept any that were discussed in class or those that are obviously correct. Do not allow duplication, such as soap opera actress and situation comedy actress).

4. Describe the job responsibilities for two of the careers you listed above.
   (Answers will vary.)



FRAME FOR BACKDROPS

Made from 1x2s or 2x4s. Should be tall enough and wide enough to "frame" two students at one time while engaged in filming activity.



Material/fabric can be draped over the backdrop frame to provide different backgrounds. This backdrop frame is not essential to the success of this activity.

Support Materials

1. Jones, Ronald E. and Robb, Janet L. *Discovering Technology: Communication*, Orlando, Florida: Harcourt Brace Jovanovich, 1986.
2. Fales, James F., et al. *Technology: Today and Tomorrow.* Mission Hills, Calif.: Glencoe Bennett McKnight, 1988.

TELECOMMUNICATION

Study the topic of telecommunication.

Objectives

- To list three types of telecommunication
- To list three social and/or environmental concerns about telecommunication
- To list five careers that could be pursued in telecommunications
- To describe the job responsibilities of the director, actor/actress, camera operator, technician, and cue card person

Vocabulary/Concepts Reinforced

- Telecommunication
- Director
- Actor/actress
- Camera operator
- Technician
- Cue card person
- Oral communication
- Written communication

Equipment/Supplies

- Video camera
- Video recording unit
- Videotapes
- Lights
- Backdrop
- Props
- Newsprint
- Masking tape
- Costumes
- Television monitor

Introduction

How many hours do you spend watching television? How much attention do you pay to the messages? Are you aware of the process that takes place before the picture appears on the screen? This learning activity will allow you to create your own message to share with your classmates over the airwaves in the classroom and give you direct control over what you see on the classroom "television station."

Telecommunication is the sending and receiving of messages over long distances. Commonly used devices in telecommunication are the telephone, radio, television, and satellites. Voice, picture, and data are all transmitted from one site to another via cable or wave transmission. Cable or optic fibers are used for telephone conversations, computer data transfer, cable TV, and local television stations. The use of microwaves to transmit information is a new use of technology. Antennae are used to send and receive information. Satellite dishes are another common receiver of information. Printed material, voice, and visual images can all be transmitted through satellites to anywhere in the world that has a satellite receiver.

Sporting events, such as the Olympics, can be seen live, even though they take place halfway around the world. International events in politics, the arts, sports, religion, and other areas of life can be seen instantly via telecommunication. This brings up some social issues that should be addressed. As a war correspondent shows pictures of the battlefield, a family in the United States watches as their son lies wounded or dead in the background. They have not received any notification from the government about this incident and are shockingly made aware of a personal tragedy through the impersonal medium of television. Can or should this be prevented? Another incident related to this could be the assassination of a political figure during a public event, such as a parade or a speech at a rally. An incident of this nature happened in June 1968, when Sen. Robert Kennedy was shot in the Ambassador Hotel in Los Angeles. Millions of people watched this tragedy as it happened. Another more recent tragedy that took place while millions were watching was the Challenger space shuttle explosion that killed seven astronauts. Should the broadcast of events such as these be delayed by an hour or so to keep people from having to see these tragedies as they happen?

Other concerns should be discussed. For instance, do viewers become violent after watching violent television shows and movies? Can viewers damage their eyes from long hours of exposure to television screens? What about environmental impacts? Is the environment being ruined by cables being strung about neighborhoods or satellite dishes being set up in yards? The satellites themselves can cause problems in outer space. How many is too many? Is it when they reach the point of crowding the orbit space around the earth? These concerns will not be solved during a classroom discussion, but awareness of problems caused by technology can help lead to their solution.

There are many careers that one can pursue in the telecommunication field. Several used in this activity include the director, actor/actress, technician, camera operator, and cue card person. Other positions—all relating to television, telephone, microwave, satellite, or radio—include technician, installer, repair person, public relations, research and development, radio or TV personality, news or show writer, sales (of commercial time), clerical support, and market researchers. Varying levels of education are required for these positions. For the technical/technician positions, a minimum requirement is a degree from a technical school. Public relations, research and development, and writing and market research positions would require a four-year college degree. Radio and TV personalities many times do not have advanced degrees, but in most cases it helps to have a degree.

Procedure

1. Research telecommunication background material. See Jones and Robb (1986) or Fales, et al. (1988) as resources.
2. Complete the worksheet on telecommunication.
3. Discuss different job descriptions to be used in the activity with your instructor.
4. Get limitations on product ideas and commercial length from your instructor.
5. Work in groups to develop ideas, write scripts, gather props, make cue cards, rehearse commercial, and videotape the commercial.
6. Present commercial to classmates. Evaluation forms will be completed by the instructor and classmates.

Evaluation

Submit final scripts and group projects to your instructor.

QUIZ

1. List three types of telecommunication.

   a. _____

   b. _____

   c. _____

2. List three social and/or environmental concerns about telecommunication.

   a. _____

   b. _____

   c. _____

3. List five careers that could be pursued in telecommunications.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

4. Describe the job responsibilities for two of the careers you listed above.

   a. _____

   _____

   _____

   _____

   b. _____

   _____

   _____

   _____

HANDOUTS

Telecommunication Worksheet

Telecommunication is _____

_____

These three types of communication are sent via telecommunication processes:

1. _____
2. _____
3. _____

List five careers that are part of the telecommunication industry:

1. _____
2. _____
3. _____
4. _____
5. _____

Television Activity

Lights! Camera! Action!!! In this assignment, you will have the opportunity to create your own television commercial. The script will have to be developed, the stars cast in their roles, the props created, the lights set, and the footage shot. Your instructor will provide you with topics.

Your topic: _____

Time limitations for the commercial: _____ seconds.

Following are the different jobs that will need to be filled. Descriptions for each person's duties will be discussed in class. You will need to write down the important information for each role.

Job Descriptions

Director: _____

_____

_____

Actor/Actress: _____

_____

_____

_____

Camera Operator: _____

_____

_____

_____

Technician: _____

_____

_____

_____

Cue Card Person: _____

_____

_____

_____

EVALUATION FORM

Answer *yes* or *no* to the following questions.

1. Is the script within the limits set by the teacher? _____
2. Is the commercial within the time limits? _____
3. Did the director fulfill the role and provide direction? _____
4. Did the actor/actress "sell" the product? _____
5. Did the technician set the stage and lighting correctly? _____
6. Did the camera operator follow cues and operate the camera? _____
7. Did the cue card person complete the task properly? _____
8. Message of commercial:
   - Appropriate to topic limits? _____
   - Clear and concise? _____
   - Does not stray from topic? _____
   - Appealing? _____
9. Overall impact of commercial:
   - Good? Average? Poor? _____

LOGO DESIGN

Essential Elements: Common: 6-10
Specific: 1-3
TAAS Objectives: Language Arts: RC 1-6

Activity Summary

This is a graphic design activity. The students will learn some of the principles of design and apply them in creating a logo that is representative of an idea. This activity can be linked to the mass production, batch production, oil refinery, or rocket activities in *Technology Systems* (EIMC, 1988). Students will work individually or in groups to design a logo and use several graphic methods to produce copies of the logo.

Teaching Tips

1. The discussion and lecture are important as they provide the students with information necessary to complete the assignment. The length of time used to teach this module will depend upon the facilities that you have available (i.e., if you have no darkroom facilities, then it would prove difficult to teach the photography section). You can also use xerography as an alternative since most schools have photocopiers.
2. Introduce all technical material, and give demonstrations before letting the students work. With all of the technical activity taking place at once, no one will be waiting for long periods of time to complete one activity. You can also set time limits for how long a person or group can use the computer to complete their assignment.
3. This activity can be used with several other modules. The logos created by the students could be for one or all of the mass production, batch manufacturing, oil refinery, rocket or CO_2 car modules in *Technology Systems* (EIMC, 1988). Creation of a logo to represent different companies or enterprises can be used for all assignments.

Instructional Strategy

- Several activities will be taking place at once. Being organized at the outset will keep confusion to a mini num. Once students have the background information and assignment sheets, they can go to work.
- You will need to give demonstrations on the different methods of graphic reproduction that you want the students to use. After this point, you will act more as a facilitator, making sure that equipment and supplies are available, assisting students who need help, and having resource and reference materials readily available.

Equipment/Supplies

1. Plain paper
2. Pencils
3. Drafting/design tools
4. Computer
5. Computer printer
6. Design package
7. Screen material
8. Frames for screens
9. Image material

10. Darkroom (B&W)
11. Chemicals, paper
12. Light source

Evaluation Key

1. Use the following criteria to grade students' logos:
   a. Completion of assignments
   b. Does logo fit criteria (size, use of color)?
   c. Does logo use elements of design (balance, visual appeal)?

QUIZ

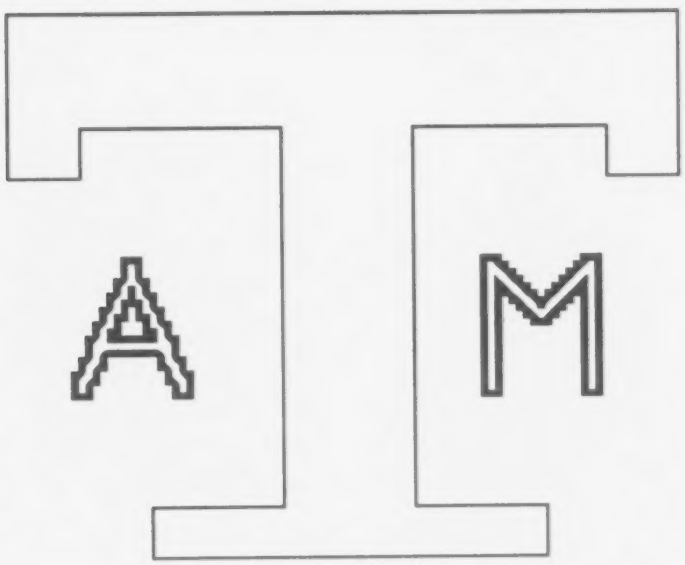
1. List the elements of design:
   a. Balance
   b. Proportion
   c. Contrast
   d. Unity
   e. Compatibility
2. List and describe two methods of graphic reproduction. (See graphic reproduction section.)
3. Sequence the events necessary to produce a graphic image with one of the following processes: a computer, a darkroom, or screen printing. (Answers may vary.)
4. Describe the concept and purpose of logos:
   Logo is a shortened version of the word *logotype*. Logos represent whole words, phrases, or ideas. The design should be an attention-getter, communicate some type of message, and leave an impression on viewers so that they will remember the logo and the accompanying message. To create attention-getting logos, designers use the elements of design.

Support Materials

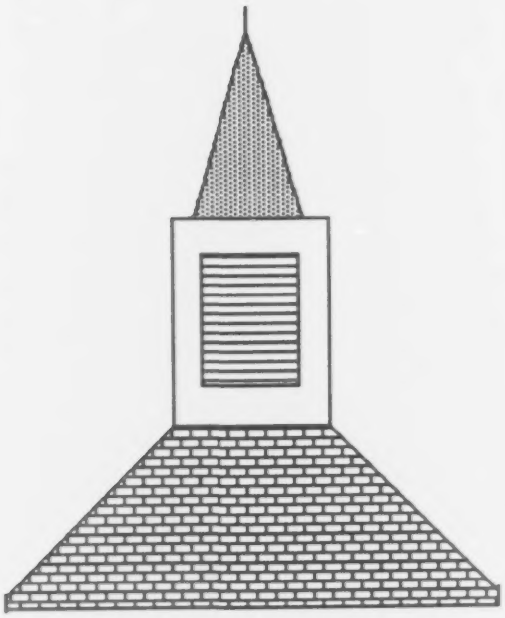
Trademarks: The Name of the Game. Film, 15 min. Available from Modern Talking Picture Service, 5000 Park Street North, St. Petersburg, FL 33709-9989. Free rental.

OVERHEAD 1

OVERHEAD 2



OVERHEAD 3



LOGO DESIGN

Learn some of the elements of design and how to use them in creating a logo that is representative of an idea.

Objectives
- To list the elements of design
- To list and describe several methods of graphic reproduction
- To sequence the events necessary to produce graphic images with a computer, a darkroom, or screen printing processes
- To describe the concept and purpose of logos
- To display the technical skills necessary to graphically reproduce a logo image through three different methods of graphic reproduction

Vocabulary/Concepts Reinforced
- Logo
- Design
- Graphic reproduction
- Written communication

Equipment/Supplies
- Plain paper
- Pencils
- Drafting/design tools
- Computer
- Computer printer
- Design package
- Screen material
- Frames for screens
- Image material
- Darkroom (B&W)
- Chemicals, paper
- Light source

Introduction

You have a problem. How can you solve it? You must create an image that represents your company to the world. The image should present your company in a positive way and create instant recognition every time individuals see your company logo. Logos represent ideas. When you see the "golden arch," what visual images come to mind? A Big Mac? Fries?

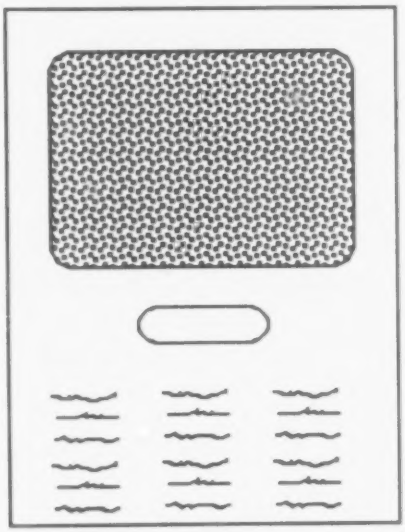
Many companies rely on the recognition factor—that you will recognize their logo and want to buy their product. Specific logos can provide powerful reminders of a company and its product. Even educational institutions use logos. Schools want you to recognize them easily—maybe you will want to go to college there, or someday send your child there. Sports programs also use logos of the school mascot. Finally, a simple design of a church steeple may cause you to think of a particular church building, or a clergy member you know. Our society is

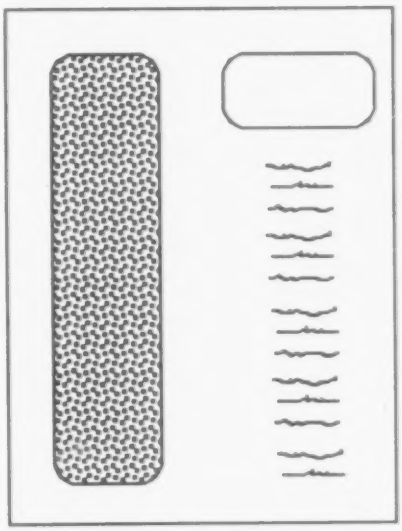
continually bombarded with visual images. This activity will provide you with a better understanding of how they are created and produced.

Logo is short for the word *logotype*. Logos represent whole words, phrases, or ideas. The design should be an attention-getter, communicate some type of message, and leave an impression on viewers so that they will remember the logo and the accompanying message. To create attention-getting logos, designers use the elements of design.

Elements of Design

The elements of design are balance, proportion, contrast, unity, and compatibility. *Balance* refers to the visual position of images in a design in relation to an imaginary center line. An advertisement that has an equal amount of words and images on both sides of the imaginary center line is considered formally balanced. An informally balanced advertisement is one in which the words and images are not spread equally across the imaginary center line.





Proportion is the element of design that refers to the relationship between the visual images in terms of size. The size of each visual image and the words used are important in presenting the viewer with a pleasing image. *Contrast* is the amount of accent or attention given to different portions of the visual message. Some simple techniques include the following:

techniques	**Bold typeface**
techniques	*Italic typeface*
techniques	Underline
techniques	Outline typeface
techniques	Shadow typeface
•techniques	use of bullets ••••
□□□ techniques	use of markers □□□
techniques	Size of type
techniques	Type of font

Unity refers to the impact that the visual and written images have on the viewer. All components of the message should work together to present a pleasing effect. The type styles, use of color, and shapes must all work in concert; no single part should be too noticeable. *Compatibility* refers to the ability of the visual image to get the viewer's attention and hold it. The images should work together, and the viewer's eye movements should flow in one direction and give a sense of placement of all of the components in the image.

These elements of design, balance, proportion, contrast, unity, and compatibility must work together to create a pleasing visual image. Creation of a logo or ad layout should include all of the elements of design. Logos can be used as part of an ad layout, such as a magazine advertisement.

Graphic Reproduction

Graphic reproduction is the use of different media to produce multiple copies of some type of visual image. Methods of graphic reproduction include offset lithography, gravure printing, screen printing, xerography, photography, computer printing, and drafting and design. In this activity, you will be using at least two different methods of graphic reproduction. You will be working (individually or in groups) to create and produce a logo.

Analyzing graphic reproduction as a communication system, we will look at the inputs, processes, outputs, and feedback. The inputs of graphic reproduction depend on the medium that we are using. In photography, the inputs would be the negative with an image on it, the paper to print on, the enlarger, the darkroom technician, and the chemicals. The processes would include exposing the paper with a light source through the negative, developing the paper, and drying the paper. The output would be the final print. Feedback would consist of examining the print to see if it satisfactory and usable. In xerography, inputs would include the machine, a person to operate the machine, paper, and original images. The process would be to create copies of the original image onto other paper. The output would be several copies of the original, and the feedback would be an assessment of the copies for usability. What would be the inputs, processes, outputs, and feedback for screen printing?

Evaluating communication systems from a "systems" approach helps to determine the scope of work that needs to be completed, how that work can be accomplished, and whether the work produced meets acceptable standards. Viewing systems in light of the input-process-output-feedback model is useful in approaching problems in an organized manner. The systematic approach to problems allows for quicker resolution of problems.

Procedure

1. Take notes and participate in discussion as your instructor presents information on logos.
2. Work individually or in groups to produce logos through at least two different methods. Design a logo to represent one of the following: a mass-production

company, a batch production company, an oil company, a rocket, a CO_2 car, the resources of technology, the school mascot, etc.

Evaluation

1. Your logo will be graded on the following criteria:
   a. Completion of assignment
   b. Does logo fit criteria (size, use of color, etc.)?
   c. Does logo use elements of design (balance, proportion, contrast, unity, and compatibility)?
2. Complete the quiz.

QUIZ

1. List the elements of design.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

2. List and describe two methods of graphic reproduction.

   a. _____

   b. _____

   Describe #a: _____

   _____

   _____

   _____

   Describe #b: _____

   _____

   _____

   _____

3. Sequence the events necessary to produce a graphic image with one of the following processes: a computer, a darkroom, or screen printing.

   Description of _____ process:

   _____

   _____

   _____

   _____

4. Describe the concept and purpose of logos.

PHOTOGRAPHY

Essential Elements: Common: 6-10
Specific: 1
TAAS Objectives: Language Arts: RC 1-6

Activity Summary
In this activity, students will compose and produce a series of photograms. The activity allows the students to be creative and exposes them to introductory darkroom techniques. This activity can be combined with the Logo Design module so that students compose a photogram of their logo.

Teaching Tips
1. If a darkroom is not available, another approach to this activity would be to have the students use cameras and shoot slide essays.
2. If using slide film that can be developed with E-6 developer, you will need the following special equipment: a black bag (or lighttight room) for transferring the film from the cannister to a reel, a film reel, a tank to develop the slides in, the chemicals to develop the slides, slide frames, and an iron to tack the slide frames closed.

Instructional Strategy
This activity could be used to study another area of technology, document a technological activity (construction of a building), display the impact of technology (environmental problems created by technological advances), or show the benefits of technology.

Equipment/Supplies
1. Darkroom, photographic enlarger, or another light source
2. Red light (to work in the darkroom)
3. Six trays for chemicals and fluids
4. Appropriate chemicals (paper developer, stop bath, fixer, hypo clearing agent)

Evaluation Key
1. Define *photogram:* Photograms are pictures made in the darkroom by placing objects directly on the photographic paper.
2. List the five major steps in creating a photogram:
   a. Turn on the light; the area it covers should be slightly larger than the size of the piece of paper; lock the head in place.
   b. Set the aperture as wide as it will open, and set the exposure time for 10 seconds. With only the darkroom safelights on (the enlarger light is off), take one piece of paper out of the paper safe.
   c. With the emulsion side up, lay the paper on the enlarger board. Arrange the objects for the first photogram on the paper.
   d. Expose the photogram for 30 seconds (for rapid papers; for all other paper, expose for one minute). The different densities of the objects allow some light to hit the emulsion of the paper; where light cannot get through, light areas will remain.
   e. Develop the photogram.

Support Materials
1. Jones, Ronald E. *Focus on Photography*. New York: McGraw-Hill, 1981.

PHOTOGRAPHY

Learn how to compose and produce a series of photograms in a photogram essay.

Objectives
- To define *photogram*
- To list the procedure for developing photographic paper
- To work safely in the darkroom

Vocabulary/Concepts Reinforced
- Photogram
- Developer
- Stop bath
- Fixer
- Hypo clearing agent
- Resin-coated paper

Equipment/Supplies
- Darkroom; photographic enlarger, or another light source
- Red light (to work in the darkroom)
- Six trays for chemicals and fluids
- Appropriate chemicals (paper developer, stop bath, fixer, hypo clearing agent)

Introduction

This assignment in photography is designed to introduce you to a communication medium for a message that is different from the printed word. You will create a photogram essay. Photograms are pictures made in the darkroom by placing objects directly on the photographic paper. Prints can be 4x5 or 8x10. They can be mounted on poster board if you wish. Captions or titles may be used; however, the medium is the photogram rather than words or drawings to present the message. You should try to have a minimum of written material and a maximum of graphic representation with the photograms.

You will be given three different topic areas, such as "explain how to do something," "represent a viewpoint or philosophy," "report or depict an event," "my favorite hobby," etc. You will choose one of these and design a photogram essay around the topic. A limit on the number of photograms in the essay—3, 5, 8, or 10, depending upon facilities, time, supplies, and budget—will be set by your instructor.

Procedure

1. Outline your essay, sketching each photogram first.
2. Before working in the darkroom, set up your materials, and arrange each photogram for content to check that each one properly presents the ideas that need to come across.
3. Watch the demonstration on the darkroom techniques for exposing the paper and developing the paper; do this procedure once, with all the lights on and without using paper.
4. Set up the enlarger. The following five steps are the most important in creating a photogram:

a. Turn on the light; the area it covers should be slightly larger than the size of the piece of paper; lock the head in place.
b. Set the aperture as wide as it will open, and set the exposure time for 10 seconds. Without the enlarger light on, just the darkroom safelights, take one piece of paper out of the paper safe.
c. With the emulsion side up, set the paper on the enlarger board. Arrange the objects for the first photogram on the paper.
d. Expose the photogram for 30 seconds (for rapid papers; for all other paper, expose for one minute). The different densities of the objects allow some light to hit the emulsion of the paper; where light cannot get through, light areas will remain.
e. Now it is time to develop the photogram. Remove the paper from the enlarger base. Handling it carefully, holding only the edges, walk over to the developer tray. With the timer running, place the print, emulsion side down, into the developer. Gently agitate the paper for the entire development time. Several seconds before the time is up, use a pair of tongs to pick up the print and let it drain over the tray of developer until the time is up. Put the print into the stop bath tray immediately. Agitate the print for the entire time recommended. Again, drain the print when the time is up. Now put the print in the fixer tray and agitate. Drain the print after the recommended time. After this point, the lights may be turned on if no one else has film out of the paper safe. Now move to the wash tray, and rinse the print for the recommended time. Hang the photogram to dry.

5. Arrange photograms in an order that reflects a theme or story. Dry-mount on poster board.

Evaluation

1. Define *photogram*: _____

_____

_____

2. List the five major steps in creating a photogram:

a. _____

b. _____

c. _____

d. _____

e. _____

FUTURE SPACE COMMUNICATION

Essential Elements: Common: 7-10
Specific: 1
TAAS Objectives: Language Arts: RC 1-6

Activity Summary
In this activity, students will study current space communication techniques and then extrapolate current practice into a future time frame. Students will work in groups to design and build a communication system for a space station, a city on earth, a city under water, and a city on another planet such that the four cities can communicate with each other.

Teaching Tips
1. This is a group activity; once you have given the students direction, they will need you as a facilitator. They should be able to work independently in their groups. This is a real exercise in creativity. Have plenty of references available that relate to communication. Students may need a point of reference from which to start .
2. You may also want to teach the students about different techniques for futures forecasting. *Understanding and Using Technology,* by Todd, McCrory, and Todd (Worcester, Mass.: Davis Publishers, 1985), has a chapter called "Futures." It discusses projections, events, trends, trend analysis, analogies, surveys, networking decisions, decision trees, future histories, scenarios, modeling, and Delphi studies. There is also a section on technology assessment in the chapter. The use of futures forecasting can be a fun and exciting activity. You could have your students do a Delphi of future communication tools with a representative from a telephone company, a computer company, and a printing company. You could have the students survey people in their neighborhood or students in the school lunchroom about new technologies and attitudes toward innovations.
3. You could team-teach a lesson on future histories with the history and English teachers. Students could write scenarios or future histories about communication and new ways to communicate. You could invite speakers from the telephone company, a computer store, or a printing company to talk to the class about how technology has changed the way their business has operated and where they think technology will take communication in their specific field.

Instructional Strategy
- Spend one day introducing the topic and assigning students to work groups. Assign students to watch a television show or movie that is futuristic (e.g., *Star Trek*, *Star Wars*) for discussion purposes later in the activity.
- On the second day, let the groups get to work. Allow them three to five days to complete their assignment.
- Allow one day for groups to present their work to the class. Include a discussion of the communication technologies observed in the television show or movie.

Equipment/Supplies
1. Scrap materials (wood, balsa, Styrofoam, sheet metal, cardboard, plywood, etc.)
2. String
3. Glue
4. Wire

5. Straws
6. Paint
7. Scissors
8. Hand tools
9. Wire screen
10. Fabric

Evaluation Key

1. List the two necessary components for a message to be communicated:
   a. Sender
   b. Receiver
2. Identify five ways that information is communicated from the school office or teacher to students, parents, or the community.
   a. Report cards
   b. Memos to faculty
   c. School newspaper
   d. Posters in the hall
   e. Articles in local newspaper
3. List three types of noise or interference that might distort the message:
   a. Student intercepting note to parent
   b. Teacher summarizing information in a memo and passing it along to someone else with vital parts missing
   c. School newspaper misquoting someone

FUTURE SPACE COMMUNICATION

Sudy current space communication techniques, and then extrapolate current practice into a future time frame.

Objectives
- To determine the necessary parts of a communication system
- To design a communication system
- To explain how technology can be adapted to meet certain needs
- To work well in groups with others
- To work safely in the lab

Vocabulary/Concepts Reinforced
- Communication (written and oral)
- Message
- Sender
- Receiver
- Noise

Equipment/Supplies
- Scrap materials (wood, balsa, Styrofoam, sheet metal, cardboard, plywood, etc.)
- String
- Glue
- Wire
- Straws
- Paint
- Scissors
- Hand tools
- Wire screen
- Fabric

Introduction

Communication happens not only between us as humans, but also between humans and machines. Computers can synthesize human speech. Voice recognition technology will soon be available, making a keyboard unnecessary, as you will be able to speak directly to the computer. Communication will change at home, at work, and in the marketplace. How will communication systems of the future look? What can we learn from television and movies such as *Star Trek*, the *Star Wars* series, Buck Rogers?

For communication to take place, a message must be developed or designed. It must be sent via a sender and received by a receiver. A problem that can arise in this communication system is called noise, which can distort the message sent. A sender is a person or object that communicates a message via a carrier. A receiver is a person or object that receives the message in an understandable way.

Procedure

1. Watch a television show or movie that is set in the future. Analyze the communication systems in the movie, and take notes for discussion in class.
2. Divide into work groups to design and build a communication system for a space station, a city on earth, a city under water, and a city on another planet such that the four cities can communicate with each other.
3. Complete group design.
4. Build communication system.
5. Present communication system to the class.
6. Participate in a class discussion on the inputs, processes, outputs, and feedback parts of the newly created communication system. Identify potential problem areas.

Evaluation

1. List the two necessary components for a message to be communicated.

   a. _____

   b. _____

2. Identify five ways that information is communicated from the school office or teacher to students, parents, or the community.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

3. List three types of noise or interference that might distort the message.

   a. _____

   b. _____

   c. _____

Support Materials

To request a program list and get on the NASA mailing list, write to the Education Office, NASA—Lyndon B. Johnson Space Center, Houston, TX 77058.

HOW WELL DO YOU COMMUNICATE?

Essential Elements: Common: 10C
Specific: 1, 2
TAAS Objectives: Language Arts: RC 1-6

Activity Summary
In this activity, students will learn the importance of accurate communication. One student will be verbally describing an object as he or she is building it, while another student tries to build the object described without seeing it.

Teaching Tips
The students may need some help getting started with their descriptions.

Instructional Strategy
Instruction in descriptive geometry should precede this activity. Include definitions of *parallel*, *vertical*, *horizontal*, *incline(d)*, *rod*, *cylinder*, *cube*, *square*, *rectangle*, *wedge*, and *cone*.

Equipment/Supplies
1. Two identical sets of unpainted building blocks
2. Table divider

Evaluation Key
This activity should probably be used to reinforce previously learned information and no grade issued; however, if this activity is used for a grade, you might use the scale below.

A = Objects "exactly" alike
B = Only one block out of place
C = Two blocks out of place
D = Three or more blocks out of place

HOW WELL DO YOU COMMUNICATE?

Complete a communication exercise with no communication errors.

Objectives
- To describe objects more accurately using the principles of shape and size
- To say exactly what you mean the first time you say it when describing an object

Vocabulary/Concepts Reinforced
- Parallel
- Rod
- Cylinder
- Cube
- Wedge
- Cone
- Vertical
- Horizontal
- Incline

Equipment/Supplies
- Two identical sets of building blocks with cones, wedges, cubes, rods, etc. They should not be painted, or at least colors may not be used as descriptors.
- Some means of separating two participants. The participants must *not* be able to see the other one's set of blocks, but they must be able to hear each other.

Introduction

During this activity, two students will be involved in descriptive communication. One student will be "sending" the communication, and the other student will be "receiving" the communication. In other words, you will have one talker and one listener. When the exercise is completed, the students will change places and repeat the procedure.

Procedure

1. Each student will receive one set of blocks. The participants then sit so they cannot see each other's blocks, with either a screen or a divider between them. Or they may just sit facing in opposite directions (back to back). Each must have a flat surface to build on.

2. The object is for one student to "build" a masterpiece while explaining (using only descriptive words) the work of art to the other student. The other student tries to build exactly the same object without ever "seeing" it. The process continues until all blocks are used. The second student may place blocks immediately after each step in the first student's description but *may not* speak or communicate in any way at all. Only the first student may speak.

Evaluation

1. To see how well you did, let's look at the "talker" since this is a communication activity and not a "listening" activity, even though both are crucial to good communication.

   If the listener's object was exactly like yours, "You did great!"
   If the listener's object had only one wrong block, "Good job!"
   If the listener's object had two wrong blocks, "Check his/her hearing."
   If the listener's object had three or more wrong blocks, "Try it again, Sam."

2. Before you try again, if needed, talk to your listener and find out where the communication broke down, where you could have been more descriptive. Don't use the same listener the second time, as he or she will know your way of communicating by now. After all, this activity is for your learning, not just to build a "masterpiece."

COMMUNICATING THROUGH GOOD PLANNING

Essential Elements: Common: 2C, 8D, 8F 10A, 10C
Specific: 1-3, 5
TAAS Objectives: Language Arts: RC 1, 2, 5; WC 1, 2, 4
Mathematics: C 4; PS 1, 2, 4

Activity Summary

In this activity, students will learn the importance of a good plan when designing a project. Each student will plan a device to transport a small object along a small wire. After each student has planned such a device, their plan will be given to two other students, who will have to construct the device using only the materials, plans, and instructions given to them in the plan.

Teaching Tips

1. It works well to have students complete the different parts of their plan on different colored sheets. This helps the other students to find the different parts of the instructions.
2. Let the students complete this activity without help from other students or from the teacher.
3. Students may not construct a vehicle using their own plan.
4. Attach the rail or line before the activity begins so you show the students what the vehicle will travel on.
5. Try to allow the students to be creative as far as their power source or how they plan their vehicle as long as they do not exceed the materials provided.

Instructional Strategy

The purpose of this activity is to show students how difficult it can be to make an object with instructions that are inadequate. Students working with good instructions will have an easier task; those with partial instructions may get frustrated. For this to be successful, you must be able to let them struggle to finish their task without a lot of assistance. This is a great activity to use before you start teaching your students to correctly plan something they are getting ready to make. This activity is designed to create some level of frustration. As students struggle, they will realize the importance of a plan.

Equipment/Supplies

1 Different colors of paper (yellow, blue, white, green, and pink)
2. Pencils, drawing paper
3. Fishing wire or string
4. Index cards
5. Paper, card stock, or old folders
6. Rubber bands
7. Balloons
8. Paper clips
9. Straws
10. Masking tape

Evaluation Key

This activity should be checked by comparing the vehicle that was built to the student's plan. Grades/credit should be given on the basis of how thoroughly the plans were written. Neatness,

accuracy, and quality of drawing could be considered as criteria for grades. Other factors would depend on individual requirements, if your vehicle differs from the one described in this activity.

Support Materials

Students should not be allowed to use resource materials on this project since the purpose is to let them discover what is necessary to plan a project. After concluding this activity, it would be a prime time to introduce what should be found in a thorough plan.

COMMUNICATING THROUGH GOOD PLANNING

Study the importance of a good plan when designing a project.

Objectives

- To use sketching/drafting skills to describe an object
- To understand the importance of good planning
- To understand the importance of reading and following instructions

Vocabulary/Concepts Reinforced

- Planning
- Bill of materials
- Working drawing
- Instructions
- Transportation
- Vehicle
- Monorail

Equipment/Supplies

- Drawing equipment—pencils, paper, tape, and drafting equipment if necessary
- Five sheets of colored paper (yellow, blue, white, green, and pink)
- Scissors
- Fishing wire or string
- Rubber bands
- Balloons
- Index cards, old folders, card stock, and paper
- Paper clips
- Masking tape
- Plastic straws

Introduction

During this activity, you will be planning a transportation vehicle to ride on a monorail system. You will be designing this vehicle to carry a small toy person safely along the rail (fishing line). The vehicle must be attached to the rail without detaching the fishing line. After designing the vehicle, your plan will be given to two other people to construct and launch. Launching of the vehicle will require a power source. The power for this vehicle can come from a combination of the materials listed above, and the two people launching the vehicle. Remember that the toy person must be transported safely.

Procedure

1. First you will need to make a set of plans for a vehicle that will travel along the fishing line. This plan will consist of a yellow sheet of paper to serve as a cover sheet. Next you will need to make a list of the materials (on a blue sheet) that will be required to make this vehicle (*Note:* If you use part of a paper clip, you will need to list one paper clip). A working drawing will be on the white sheet of paper. The green sheet will give detailed instructions of the construction process. The last sheet will be pink, and will explain how your vehicle will be launched.

2. After completing the plans, you will need to pick a partner and choose a plan from all the completed plans. Make sure the plans are not one of yours. Read through the set of plans that you have picked, and then get the materials that you will need to complete the vehicle. You will have to do the best you can with the instructions provided. If the plans are incomplete, or not very clear, then you may try to interpret their meaning or intent. You may not ask or seek help from anyone outside your group.
3. After each group has completed their vehicle, each group will be given the opportunity to place its vehicle on the string with the small toy person in it. Follow the launching instructions that came with your plan. Keep track of how far your vehicle went, and compare it with the other groups' vehicles. Compare the final vehicle with what the designer had anticipated.
4. At the conclusion of this activity, write a brief summary of the success/failure of building the vehicle using the instructions supplied. What would you do differently if you were asked to plan another project for someone else to build?

Evaluation

You will be given full credit for this assignment if the following criteria are met:

- A completed set of plans using the instructions given
- A completed vehicle constructed using the plans given
- An evaluation report

Extra credit should be given for the most successful vehicles, as well as for the most thorough plans.

COMPLIANCE STATEMENT

TITLE VI, CIVIL RIGHTS ACT OF 1964; THE MODIFIED COURT ORDER, CIVIL ACTION 5281, FEDERAL DISTRICT COURT, EASTERN DISTRICT OF TEXAS, TYLER DIVISION

Reviews of local education agencies pertaining to compliance with Title VI Civil Rights Act of 1964 and with specific requirements of the Modified Court Order, Civil Action No. 5281, Federal District Court, Eastern District of Texas, Tyler Division are conducted periodically by staff representatives of the Texas Education Agency. These reviews cover at least the following policies and practices:

(1) acceptance policies on student transfers from other school districts;

(2) operation of school bus routes or runs on a non-segregated basis;

(3) nondiscrimination in extracurricular activities and the use of school facilities;

(4) nondiscriminatory practices in the hiring, assigning, promoting, paying, demoting, reassigning, or dismissing of faculty and staff members who work with children;

(5) enrollment and assignment of students without discrimination on the basis of race, color, or national origin;

(6) nondiscriminatory practices relating to the use of a student's first language; and

(7) evidence of published procedures for hearing complaints and grievances.

In addition to conducting reviews, the Texas Education Agency staff representatives check complaints of discrimination made by a citizen or citizens residing in a school district where it is alleged discriminatory practices have occurred or are occurring.

Where a violation of Title VI of the Civil Rights Act is found, the findings are reported to the Office for Civil Rights, Department of Health, Education and Welfare.

If there is a direct violation of the Court Order in Civil Action No. 5281 that cannot be cleared through negotiation, the sanctions required by the Court Order are applied.

TITLE VII, CIVIL RIGHTS ACT OF 1964: EXECUTIVE ORDERS 11246 and 11375; TITLE IX 1973 EDUCATION AMENDMENTS: REHABILITATION ACT OF 1973 AS AMENDED; 1974 AMENDMENTS TO THE WAGE-HOUR LAW EXPANDING THE AGE DISCRIMINATION IN EMPLOYMENT ACT OF 1967; VIETNAM ERA VETERANS READJUSTMENT ASSISTANCE ACT OF 1972 AS AMENDED IN 1974.

It is the policy of the Texas Education Agency to comply fully with the nondiscrimination provisions of all federal and state laws and regulation by assuring that no person shall be excluded from consideration for recruitment, selection, appointment, training, promotion, retention, or any other personnel action, or be denied any benefits or participation in any programs of activities which it operates on the grounds of race, religion, color, national origin, sex, handicap, age, or veteran status (except where age, sex, or handicap constitute a bona fide occupational qualification necessary to proper and efficient administration). The Texas Education Agency makes positive efforts to employ and advance in employment all protected groups.